

Multivariate Statistical Process Control Process Monitoring Methods And Applications Advances In Industrial Control

Statistical Process Monitoring Using Advanced Data-Driven and Deep Learning Approaches
Multivariate Statistical Process Control *Unsupervised Process Monitoring and Fault Diagnosis with Machine Learning Methods* **Distribution-Free Methods for Statistical Process Monitoring and Control** **Bayesian Process Monitoring, Control and Optimization** **Artifact-Driven Business Process Monitoring** *Statistical Process Monitoring and Optimization* **Distribution-Free Methods for Statistical Process Monitoring and Control** *Statistical Monitoring of Complex Multivariate Processes* *Real-Time Weld Process Monitoring* **Fundamentals of Business Process Management** **Data Mining and Knowledge Discovery for Process Monitoring and Control** *Process Monitoring, Diagnostics and Prognostics in Machining Processes* *Data-Driven Fault Detection and Reasoning for Industrial Monitoring* **Development of in situ methods for process monitoring and control and characterization of Cu-Zn-Sn-S based thin films** *Intelligent Process Monitoring and Control Using Sensor Data* *Statistical Process Monitoring Using Advanced Data-Driven and Deep Learning Approaches* **Fault Diagnosis and Detection** *Dynamic Modeling of Complex Industrial Processes: Data-driven Methods and Application Research* **Solid State Development and Processing of Pharmaceutical Molecules** *Iterative Multiscale Methods for Process Monitoring* **Implementation Monitoring and Process Evaluation** *Industrial Crystallization Process Monitoring and Control* *Data Analysis and Applications 3* **Data-driven Fault Detection and Reasoning for Industrial Monitoring** **Statistical Analysis of Profile Monitoring** **Analyzing Costs, Procedures, Processes, and Outcomes in Human Services** **Data-driven Methods for Fault Detection and Diagnosis in Chemical Processes** *Biomass Modification, Characterization and Process Monitoring* *Analytics to Support Biofuel and Biomaterial Production* *Food Process Monitoring Systems* **Assessment of the State-Of-The-Art for Process Monitoring** **Sensors for Polymer Composites** **Batch Fermentation** *Fault Detection and Diagnosis in Industrial Systems* **Plug-and-Play Monitoring and Performance Optimization for Industrial Automation Processes** *Systems Concepts in Action* **Chemical Process Performance Evaluation** **Monitoring the Winemaking Process from Grapes to Wine** **Novel Methods for Monitoring and Managing Land and Water Resources in Siberia** *Measurement, Monitoring, Modelling and Control of Bioprocesses* *Bayesian Process Monitoring, Control and Optimization*

This is likewise one of the factors by obtaining the soft documents of this **Multivariate Statistical Process Control Process Monitoring Methods And Applications Advances In Industrial Control** by online. You might not require more mature to spend to go to the ebook instigation as capably as search for them. In some cases, you likewise get not discover the broadcast Multivariate Statistical Process Control Process Monitoring Methods And Applications Advances In Industrial Control that you are looking for. It will entirely squander the time.

However below, like you visit this web page, it will be thus very simple to get as with ease as download lead Multivariate Statistical Process Control Process Monitoring Methods And Applications Advances In Industrial Control

It will not bow to many era as we run by before. You can pull off it even if work something else at house and even in your workplace. hence easy! So, are you question? Just exercise just what we provide under as well as evaluation **Multivariate Statistical Process Control Process**

Monitoring Methods And Applications Advances In Industrial Control what you later than to read!

Fundamentals of Business Process Management Dec 25 2021 This textbook covers the entire Business Process Management (BPM) lifecycle, from process identification to process monitoring, covering along the way process modelling, analysis, redesign and automation. Concepts, methods and tools from business management, computer science and industrial engineering are blended into one comprehensive and inter-disciplinary approach. The presentation is illustrated using the BPMN industry standard defined by the Object Management Group and widely endorsed by practitioners and vendors worldwide. In addition to explaining the relevant conceptual background, the book provides dozens of examples, more than 230 exercises - many with solutions - and numerous suggestions for further reading. This second edition includes extended and completely revised chapters on process identification, process discovery, qualitative process analysis, process redesign, process automation and process monitoring. A new chapter on BPM as an enterprise capability has been added, which expands the scope of the book to encompass topics such as the strategic alignment and governance of BPM initiatives. The textbook is the result of many years of combined teaching experience of the authors, both at the undergraduate and graduate levels as well as in the context of professional training. Students and professionals from both business management and computer science will benefit from the step-by-step style of the textbook and its focus on fundamental concepts and proven methods. Lecturers will appreciate the class-tested format and the additional teaching material available on the accompanying website.

Statistical Analysis of Profile Monitoring Sep 09 2020 A one-of-a-kind presentation of the major achievements in statistical profile monitoring methods Statistical profile monitoring is an area of statistical quality control that is growing in significance for researchers and practitioners, specifically because of its range of applicability across various service and manufacturing settings. Comprised of contributions from renowned academicians and practitioners in the field, Statistical Analysis of Profile Monitoring presents the latest state-of-the-art research on the use of control charts to monitor process and product quality profiles. The book presents comprehensive coverage of profile monitoring definitions, techniques, models, and application examples, particularly in various areas of engineering and statistics. The book begins with an introduction to the concept of profile monitoring and its applications in practice. Subsequent chapters explore the fundamental concepts, methods, and issues related to statistical profile monitoring, with topics of coverage including: Simple and multiple linear profiles Binary response profiles Parametric and nonparametric nonlinear profiles Multivariate linear profiles monitoring Statistical process control for geometric specifications Correlation and autocorrelation in profiles Nonparametric profile monitoring Throughout the book, more than two dozen real-world case studies highlight the discussed topics along with innovative examples and applications of profile monitoring. Statistical Analysis of Profile Monitoring is an excellent book for courses on statistical quality control at the graduate level. It also serves as a valuable reference for quality engineers, researchers and anyone who works in monitoring and improving statistical processes.

Distribution-Free Methods for Statistical Process Monitoring and Control Mar 28 2022 This book explores nonparametric statistical process control. It provides an up-to-date overview of nonparametric Shewhart-type univariate control charts, and reviews the recent literature on nonparametric charts, particularly multivariate schemes. Further, it discusses observations tied to the monitored population quantile, focusing on the Shewhart Sign chart. The book also addresses the issue of practically assuming the normality and the independence when a process is statistically monitored, and examines in detail change-point analysis-based distribution-free control charts designed for Phase I applications. Moreover, it introduces six distribution-free EWMA schemes for simultaneously monitoring the location and scale parameters of a univariate continuous process, and establishes two nonparametric Shewhart-type control charts based on order statistics with signaling

runs-type rules. Lastly, the book proposes novel and effective method for early disease detection.

Statistical Process Monitoring Using Advanced Data-Driven and Deep Learning Approaches Nov 04 2022 Statistical Process Monitoring Using Advanced Data-Driven and Deep Learning Approaches tackles multivariate challenges in process monitoring by merging the advantages of univariate and traditional multivariate techniques to enhance their performance and widen their practical applicability. The book proceeds with merging the desirable properties of shallow learning approaches – such as a one-class support vector machine and k-nearest neighbours and unsupervised deep learning approaches – to develop more sophisticated and efficient monitoring techniques. Finally, the developed approaches are applied to monitor many processes, such as waste-water treatment plants, detection of obstacles in driving environments for autonomous robots and vehicles, robot swarm, chemical processes (continuous stirred tank reactor, plug flow reactor, and distillation columns), ozone pollution, road traffic congestion, and solar photovoltaic systems. Uses a data-driven based approach to fault detection and attribution Provides an in-depth understanding of fault detection and attribution in complex and multivariate systems Familiarises you with the most suitable data-driven based techniques including multivariate statistical techniques and deep learning-based methods Includes case studies and comparison of different methods

Data-driven Methods for Fault Detection and Diagnosis in Chemical Processes Jul 08 2020 Early and accurate fault detection and diagnosis for modern chemical plants can minimise downtime, increase the safety of plant operations, and reduce manufacturing costs. The process-monitoring techniques that have been most effective in practice are based on models constructed almost entirely from process data. The goal of the book is to present the theoretical background and practical techniques for data-driven process monitoring. Process-monitoring techniques presented include: Principal component analysis; Fisher discriminant analysis; Partial least squares; Canonical variate analysis. The text demonstrates the application of all of the data-driven process monitoring techniques to the Tennessee Eastman plant simulator - demonstrating the strengths and weaknesses of each approach in detail. This aids the reader in selecting the right method for his process application. Plant simulator and homework problems in which students apply the process-monitoring techniques to a nontrivial simulated process, and can compare their performance with that obtained in the case studies in the text are included. A number of additional homework problems encourage the reader to implement and obtain a deeper understanding of the techniques. The reader will obtain a background in data-driven techniques for fault detection and diagnosis, including the ability to implement the techniques and to know how to select the right technique for a particular application.

Systems Concepts in Action Dec 01 2019 Systems Concepts in Action: A Practitioner's Toolkit offers out a wide range of systems methods to help readers investigate, evaluate and intervene in complex messy situations.

Real-Time Weld Process Monitoring Jan 26 2022 Welding is a complex process, is increasingly automated, and operates at higher speeds in more difficult environments. Defects also need to be detected as they arise to ensure efficient, high-quality production. All these needs have led to a growing interest in the use of sensors to provide accurate, robust, real-time monitoring where this cannot be achieved by more traditional testing and inspection techniques. This important book reviews the range of monitoring techniques available and their applications. After an introductory chapter, the first part of the book reviews the range of sensor technologies in welding, from arc and optical sensors to infrared and ultrasonic techniques. Part two discusses the monitoring of particular aspects of welding such as weld seams and profiles, the analysis of weld penetration and weld pool surface, as well as monitoring of resistance and laser welding. With its distinguished editor and international team of contributors, Real-time weld process monitoring is a valuable reference to all those concerned with improving the quality of welding and welded components. Reviews the range of monitoring techniques available Examines the range of sensor technologies in welding from arc and optical sensors to infrared and ultrasonic techniques Discusses the monitoring of specific aspects of welding such as weld seams, resistance and laser welding

Industrial Crystallization Process Monitoring and Control Dec 13 2020 Crystallization is an important technique for separation and purification of substances as well as for product design in chemical, pharmaceutical and biotechnological process industries. This ready reference and handbook draws on research work and industrial practice of a large group of experts in the various areas of industrial crystallization processes, capturing the essence of current trends, the markets, design tools and technologies in this key field. Along the way, it outlines trouble free production, provides laboratory controls, analyses case studies and discusses new challenges. First the instrumentation and techniques used to measure the crystal size distribution, the nucleation and solubility points, and the chemical composition of the solid and liquid phase are outlined. Then the main techniques adopted to control industrial crystallizers, starting from fundamental approaches to the most advanced ones, including the multivariable predictive control are described. An overview of the main crystallizer types is given with details of the main control schemes adopted in industry as well as the more suitable sensors and actuators.

Data-driven Fault Detection and Reasoning for Industrial Monitoring Oct 11 2020 This open access book assesses the potential of data-driven methods in industrial process monitoring engineering. The process modeling, fault detection, classification, isolation, and reasoning are studied in detail. These methods can be used to improve the safety and reliability of industrial processes. Fault diagnosis, including fault detection and reasoning, has attracted engineers and scientists from various fields such as control, machinery, mathematics, and automation engineering. Combining the diagnosis algorithms and application cases, this book establishes a basic framework for this topic and implements various statistical analysis methods for process monitoring. This book is intended for senior undergraduate and graduate students who are interested in fault diagnosis technology, researchers investigating automation and industrial security, professional practitioners and engineers working on engineering modeling and data processing applications. This is an open access book.

Fault Detection and Diagnosis in Industrial Systems Feb 01 2020 Early and accurate fault detection and diagnosis for modern chemical plants can minimize downtime, increase the safety of plant operations, and reduce manufacturing costs. This book presents the theoretical background and practical techniques for data-driven process monitoring. It demonstrates the application of all the data-driven process monitoring techniques to the Tennessee Eastman plant simulator, and looks at the strengths and weaknesses of each approach in detail. A plant simulator and problems allow readers to apply process monitoring techniques.

Dynamic Modeling of Complex Industrial Processes: Data-driven Methods and Application Research Apr 16 2021 This thesis develops a systematic, data-based dynamic modeling framework for industrial processes in keeping with the slowness principle. Using said framework as a point of departure, it then proposes novel strategies for dealing with control monitoring and quality prediction problems in industrial production contexts. The thesis reveals the slowly varying nature of industrial production processes under feedback control, and integrates it with process data analytics to offer powerful prior knowledge that gives rise to statistical methods tailored to industrial data. It addresses several issues of immediate interest in industrial practice, including process monitoring, control performance assessment and diagnosis, monitoring system design, and product quality prediction. In particular, it proposes a holistic and pragmatic design framework for industrial monitoring systems, which delivers effective elimination of false alarms, as well as intelligent self-running by fully utilizing the information underlying the data. One of the strengths of this thesis is its integration of insights from statistics, machine learning, control theory and engineering to provide a new scheme for industrial process modeling in the era of big data.

Multivariate Statistical Process Control Oct 03 2022 Given their key position in the process control industry, process monitoring techniques have been extensively investigated by industrial practitioners and academic control researchers. Multivariate statistical process control (MSPC) is one of the most popular data-based methods for process monitoring and is widely used in various industrial areas. Effective routines for process monitoring can help operators run industrial

processes efficiently at the same time as maintaining high product quality. Multivariate Statistical Process Control reviews the developments and improvements that have been made to MSPC over the last decade, and goes on to propose a series of new MSPC-based approaches for complex process monitoring. These new methods are demonstrated in several case studies from the chemical, biological, and semiconductor industrial areas. Control and process engineers, and academic researchers in the process monitoring, process control and fault detection and isolation (FDI) disciplines will be interested in this book. It can also be used to provide supplementary material and industrial insight for graduate and advanced undergraduate students, and graduate engineers. *Advances in Industrial Control* aims to report and encourage the transfer of technology in control engineering. The rapid development of control technology has an impact on all areas of the control discipline. The series offers an opportunity for researchers to present an extended exposition of new work in all aspects of industrial control.

Development of in situ methods for process monitoring and control and characterization of Cu-Zn-Sn-S based thin films

Aug 21 2021 In recent years, kesterite $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) has become an interesting alternative to copper indium gallium (di)selenide (CIGS) due to its non-toxic and earth abundant constituents. A variety of methods is being used to fabricate kesterite thin films, such as coevaporation, sputtering, electrodeposition, spray pyrolysis and others. Most of them include an annealing step to stimulate elemental mixing and interdiffusion. Although conversion efficiencies of kesterite solar cells have increased among different research groups, the record value of 12.6% set by IBM in 2014 has not been broken yet. Therefore, experimental and theoretical studies are needed to predict the effect of the secondary phases and detrimental defects on the electronical properties of the CZTS based solar devices. The work presented here studies non-destructive techniques for in situ process control and monitoring. With the aim to detect phases and phase transitions to optimize crucial processing steps such as pre-annealing of metal precursors, high temperature annealing and vacuum deposition of Cu-Sn-Zn-S based thin films. The research consists of three parts in which Raman spectroscopy, X-ray diffraction (XRD) and reflectometry are used to explore this objective. In the first part Raman spectroscopy is investigated as an in situ monitoring technique during high temperature annealing of thin films. It investigates whether the occurrence of CZTS can be monitored when it is created from annealing a Mo/CTS/ZnS layered thin film. CuS, SnS, ZnS and CTS (Cu-Sn-S) films are prepared by physical vapor deposition. The Raman scattering intensity was compared to investigate whether their specific vibrational modes can be distinguished from each other at room temperature. Then, the CTS film is annealed between 50 and 550 °C in order to investigate whether CTS vibrational modes can be identified at elevated temperatures and to see which transitions take place within the thin film. Also, a CZTS reference film is annealed between 50 and 550 °C for reference purposes. The temperature dependence of the main CZTS modes is examined to investigate whether it can be used for in situ temperature control. Finally, a ZnS layer is deposited on the unannealed CTS film to obtain a Mo/CTS/ZnS layered film. This film is used to study the conversion of CTS/ZnS into CZTS at elevated temperatures. It was found that Raman spectroscopy can successfully be used to monitor formation of CZTS by identifying its main vibrational mode during the annealing process. The intensity of the CTS modes reduces at elevated temperatures. At 450 °C, the main CZTS mode at 338 cm^{-1} can be clearly identified. The second part also focuses on high temperature annealing. However, in this part the focus lies on annealing of the metal precursor films. It is explored whether specific alloys benefit or hinder the formation of secondary phases during formation of the CZTS absorber films. Also, to what extent this influences solar cell performance. In situ XRD was investigated for in situ monitoring of the pre-annealing process. Cu-poor metal precursor films are prepared by sputtering deposition. The precursors are annealed at 150 °C, 200 °C, 300 °C and 450 °C in a three zone tube furnace. The effect on the structural properties is analysed by XRD to study the formation mechanism of alloys. The precursor films are then sulfurized in a three zone tube furnace. The structural properties of the absorber are analysed and correlated with structures in the precursor. It is found that formation of SnS_2 in the absorber is proportional to the remaining Sn in the pre-annealed precursor. Also,

electron micrographs showed that pre-annealing temperature influences grain growth and surface precipitation of Sn-S and Zn-S. Pre-annealed absorbers at 450 °C did not exhibit these phases on the surface. Solar devices are fabricated from the absorber films and best performing devices were obtained from pre-annealed absorbers at 450 °C. They showed absence of Sn and SnS₂ in, respectively, the precursor and absorber. It could be concluded that SnS₂ phases are detrimental to device efficiency and that SnS₂ XRD peak intensity follows an inverse proportionality with device efficiency. The third part explores reflectometry as a method to monitor a growing film during thermal evaporation in a physical vapor deposition (PVD) system. A set of six CZTS absorbers is examined by ex situ Raman spectroscopy and reflectometry to study the influence of secondary phases CuS and ZnS on reflection spectra. Composition strongly influences reflection spectra and CuS leaves a characteristic dip in the reflection spectrum at about 600 nm. An integration method was used to analyze this phenomenon quantitatively. Subsequently, a reflectometry setup is designed, developed and integrated in the PVD system. Four different CZTS co-evaporated and multi-layered films are deposited. Structural, morphological and vibrational properties are investigated. The reflection spectra are monitored during deposition and time-dependent reflection spectra are analyzed for characteristic aspects related to properties such as thickness, band gap and phase formation. CuS could not be detected in the films by the integration method due to the superposition of the CuS dip with developing interference fringes during film growth. However, in multilayered CTS/ZnS film it is found that the onset of ZnS deposition can be detected by increased reflection intensity due to reduced surface roughness. Additionally, the shifting onset of the interference fringes to lower photon energies can be used as a characteristic fingerprint during the deposition process. In conclusion, this work showed that Raman spectroscopy, XRD and reflectometry could be successfully implemented for in situ process control and monitoring of high temperature annealing and vacuum deposition of Cu-Sn-Zn-S based precursors and absorbers. The application of these in situ techniques can lead to the optimization of thin film material properties and solar cells. As such, this study has paved the way for further improvement of Cu-Sn-Zn-S based precursors and thin film absorbers. Innerhalb der letzten Jahre hat sich Kesterit Cu₂ZnSnS₄ (CZTS) aufgrund seiner ungiftigen Bestandteile und deren hoher Verfügbarkeit zu einer interessanten Alternative zu Kupfer Indium Gallium (di-)Selenid (CIGS) entwickelt. Zur Herstellung von Kesterit Dünnschichten wird eine Vielzahl von Methoden verwendet wie Ko-Verdampfung, Sputtern, Elektrodeposition, Spray Pyrolyse und andere. Die meisten davon beinhalten einen Temper-Schritt um die Durchmischung und Interdiffusion der Elemente zu stimulieren. Obwohl der Wirkungsgrad der Kesterit Solarzellen von verschiedenen Forschungsgruppen erhöht wurde, ist der Rekordwert von IBM von 12,6 % noch nicht gebrochen worden. Daher werden experimentelle und theoretische Studien benötigt, die den Einfluss von Fremdphasen und schädlichen Defekten auf die elektronischen Eigenschaften der CZTS Solarzellen vorhersagen. Die vorliegende Arbeit untersucht zerstörungsfreie Methoden für die in situ Prozesskontrolle und -überwachung. Dabei ist das Ziel, entscheidende Prozessschritte wie das Vortempern der Metall-Vorläufer sowie das Hochtemperatur-Tempern und die Vakuum-Abscheidung von Cu-Sn-Zn-S basierten Schichten zu optimieren. Die Untersuchung besteht aus drei Teilen, in denen Raman-Spektroskopie, Röntgendiffraktion (XRD) und Reflektometrie benutzt werden um dieses Ziel zu erreichen. Im ersten Teil wird die Ramanspektroskopie als in situ Methode zur Überwachung des Hochtemperatur-Temperns von Dünnschichten betrachtet. Es wird untersucht, ob das Entstehen von CZTS beim Tempern von gestapelten Mo/CTS/ZnS Dünnschichten beobachtet werden kann. CuS, SnS, ZnS und CTS (Cu-Sn-S) Schichten werden durch physikalische Gasabscheidung hergestellt. Die Intensität der Raman Streuung wurde verglichen um zu untersuchen, ob die spezifischen Vibrations-Moden bei Raumtemperatur voneinander unterschieden werden können. Dann werden die CTS Schichten zwischen 50 °C und 550 °C getempert um zu untersuchen, ob die CTS Vibrations-Moden bei höheren Temperaturen identifiziert werden können und um festzustellen, welche Übergänge innerhalb der Schicht auftreten. Außerdem wurde eine CZTS Referenzschicht zwischen 50 °C und 550 °C für Referenzzwecke getempert worden. Die Temperaturabhängigkeit der CZTS Haupt-Moden werden

betrachtet, um zu untersuchen, ob sie für die in situ Temperaturüberwachung verwendet werden können. Abschließend wurde eine ZnS Schicht auf einem nicht getemperten CTS Film abgeschieden, um eine gestapelte Mo/CTS/ZnS Schicht zu erhalten. Diese Schicht wird verwendet, um die Umwandlung von CTS/ZnS zu CZTS bei erhöhten Temperaturen zu untersuchen. Es wurde festgestellt, dass Raman Spektroskopie erfolgreich verwendet werden kann, um die Bildung von CZTS zu überwachen, indem die Haupt-Vibrations-Moden während des Temperns identifiziert werden. Die Intensität der CTS Moden verringert sich bei höheren Temperaturen. Bei 450 °C kann die CZTS Hauptmode bei 338 cm⁻¹ klar identifiziert werden. Der zweite Teil konzentriert sich ebenfalls auf das Hochtemperatur-Tempern. In diesem Teil liegt der Fokus allerdings auf dem Tempern der Metal-Vorläufer-Schichten. Es wird erforscht, ob bestimmte Legierungen die Entstehung von Fremdphasen während der Entstehung der CZTS Absorberschichten begünstigen oder hemmen und welchen Einfluss dies auf die Leistung der Solarzelle hat. In situ XRD wird verwendet, um die Prozesse des Vortemperns zu überwachen. Kupfer arme Metall-Vorläufer-Schichten werden durch Sputtern aufgetragen. Die Vorläufer werden bei 150 °C, 200 °C, 300 °C und 450 °C in einem Drei-Zonen-Röhren-Ofen getempert. Die Auswirkungen auf die strukturellen Eigenschaften werden mit XRD analysiert, um den Entstehungsmechanismus der Legierungen zu untersuchen. Die Vorläuferschichten werden dann in einem Drei-Zonen-Röhren-Ofen sulfurisiert. Die strukturellen Eigenschaften des Absorbers werden analysiert und mit der Struktur der Vorläufer korreliert. Es wurde festgestellt, dass die Entstehung von SnS₂ im Absorber proportional zum verbleibenden Sn im vorgetemperten Vorläufer ist. Außerdem zeigen Bilder des Rasterelektronenmikroskops, dass die Temperatur des Vortemperns das Kornwachstum und das Abscheiden von Sn-S und Zn-S an der Oberfläche beeinflusst. Bei 450 °C vorgetemperte Absorber weisen keine dieser Phasen an der Oberfläche auf. Solarzellen werden aus diesen Absorberschichten hergestellt und die besten Zellen entstanden aus den bei 450 °C vorgetemperten Absorbern. Bei diesen traten Sn und SnS₂ weder im Vorläufer noch im Absorber auf. Es konnte geschlossen werden, dass SnS₂ Phasen schädlich für den Wirkungsgrad der Zellen sind und dass die Intensität der SnS₂ XRD Peaks invers proportional zum Wirkungsgrad der Zellen ist. Der dritte Teil erforscht die Reflektometrie als Methode zur Überwachung des Schichtwachstums während des thermischen Verdampfens in einer Anlage zur physikalischen Gasabscheidung (PVD). Ein Satz aus sechs CZTS Absorbern wird mittels ex situ Raman-Spektroskopie und Reflektometrie vermessen, um den Einfluss der Fremdphasen CuS und ZnS auf die Reflexionsspektren zu untersuchen. Die Zusammensetzung beeinflusst die Reflexionsspektren stark und CuS hinterlässt eine charakteristische Senkung bei 600 nm im Reflexionsspektrum. Eine Integrationsmethode wurde verwendet um dieses Phänomen quantitativ zu analysieren. Anschließend wurde ein Reflektometrieaufbau entworfen, entwickelt und in die PVD-Anlage integriert. Vier verschiedene CZTS koverdampfte und Mehrschicht-Filme wurden abgeschieden. Strukturelle, morphologische und Vibrationseigenschaften werden untersucht. Die Reflexionsspektren werden während des Abscheidens aufgenommen und zeitabhängige Reflexionsspektren werden auf charakteristische Aspekte im Zusammenhang mit Eigenschaften wie Dicke, Bandlücke und Entstehung von Phasen untersucht. CuS konnte in den Schichten mit der Integrations-Methode wegen der Überlagerung der CuS Senkung mit dem entstehenden Interferenzmuster nicht detektiert werden. Allerdings wurde in gestapelten CTS/ZnS Schichten beobachtet werden, dass der Beginn der ZnS Abscheidung durch eine ansteigende Intensität der Reflexion aufgrund der verringerten Oberflächenrauigkeit detektiert werden kann. Zusätzlich kann die Verschiebung des Startpunkts der Interferenzen zu niedrigeren Photonenenergien als charakteristischer Fingerabdruck während des Abscheidungsprozesses verwendet werden. Zusammenfassend zeigt diese Arbeit, dass Raman-Spektroskopie, XRD und Reflektometrie erfolgreich als in situ Prozesskontrolle und -überwachung bei Hochtemperatur-Tempern und Vakuum-Abscheidung von Cu-Sn-Zn-S basierten Vorläufern und Absorbern realisiert werden konnten. Die Anwendung dieser in situ Techniken kann zu einer Optimierung der Eigenschaften von Dünnschicht-Materialien und von Solarzellen führen. Als solche hat diese Untersuchung den Weg für weitere Verbesserung von Cu-Sn-Zn-S basierte Vorläufer und

Dünnschicht-Absorber geebnet.

Unsupervised Process Monitoring and Fault Diagnosis with Machine Learning Methods Sep 02 2022

This unique text/reference describes in detail the latest advances in unsupervised process monitoring and fault diagnosis with machine learning methods. Abundant case studies throughout the text demonstrate the efficacy of each method in real-world settings. The broad coverage examines such cutting-edge topics as the use of information theory to enhance unsupervised learning in tree-based methods, the extension of kernel methods to multiple kernel learning for feature extraction from data, and the incremental training of multilayer perceptrons to construct deep architectures for enhanced data projections. Topics and features: discusses machine learning frameworks based on artificial neural networks, statistical learning theory and kernel-based methods, and tree-based methods; examines the application of machine learning to steady state and dynamic operations, with a focus on unsupervised learning; describes the use of spectral methods in process fault diagnosis.

Distribution-Free Methods for Statistical Process Monitoring and Control Aug 01 2022 This book explores nonparametric statistical process control. It provides an up-to-date overview of nonparametric Shewhart-type univariate control charts, and reviews the recent literature on nonparametric charts, particularly multivariate schemes. Further, it discusses observations tied to the monitored population quantile, focusing on the Shewhart Sign chart. The book also addresses the issue of practically assuming the normality and the independence when a process is statistically monitored, and examines in detail change-point analysis-based distribution-free control charts designed for Phase I applications. Moreover, it introduces six distribution-free EWMA schemes for simultaneously monitoring the location and scale parameters of a univariate continuous process, and establishes two nonparametric Shewhart-type control charts based on order statistics with signaling runs-type rules. Lastly, the book proposes novel and effective method for early disease detection.

Data Mining and Knowledge Discovery for Process Monitoring and Control Nov 23 2021 Modern computer-based control systems are able to collect a large amount of information, display it to operators and store it in databases but the interpretation of the data and the subsequent decision making relies mainly on operators with little computer support. This book introduces developments in automatic analysis and interpretation of process-operational data both in real-time and over the operational history, and describes new concepts and methodologies for developing intelligent, state space-based systems for process monitoring, control and diagnosis. The book brings together new methods and algorithms from process monitoring and control, data mining and knowledge discovery, artificial intelligence, pattern recognition, and causal relationship discovery, as well as signal processing. It also provides a framework for integrating plant operators and supervisors into the design of process monitoring and control systems.

[Biomass Modification, Characterization and Process Monitoring Analytics to Support Biofuel and Biomaterial Production](#) Jun 06 2020 The conversion of lignocellulosic biomass into renewable fuels and other commodities has provided an appealing alternative towards supplanting global dependence on fossil fuels. The suitability of multitudes of plants for deconstruction to useful precursor molecules and products is currently being evaluated. These studies have probed a variety of phenotypic traits, including cellulose, non-cellulosic polysaccharide, lignin, and lignin monomer composition, glucose and xylose production following enzymatic hydrolysis, and an assessment of lignin-carbohydrate and lignin-lignin linkages, to name a few. These quintessential traits can provide an assessment of biomass recalcitrance, enabling researchers to devise appropriate deconstruction strategies. Plants with high polysaccharide and lower lignin contents have been shown to breakdown to monomeric sugars more readily. Not all plants contain ideal proportions of the various cell wall constituents, however. The capabilities of biotechnology can alleviate this conundrum by tailoring the chemical composition of plants to be more favorable for conversion to sugars, fuels, etc. Increases in the total biomass yield, cellulose content, or conversion efficiency through, for example, a reduction in lignin content, are pathways being evaluated to genetically improve plants for use in manufacturing biofuels and bio-based chemicals. Although plants have been previously domesticated

for food and fiber production, the collection of phenotypic traits prerequisite for biofuel production may necessitate new genetic breeding schemes. Given the plethora of potential plants available for exploration, rapid analytical methods are needed to more efficiently screen through the bulk of samples to hone in on which feedstocks contain the desired chemistry for subsequent conversion to valuable, renewable commodities. The standard methods for analyzing biomass and related intermediates and finished products are laborious, potentially toxic, and/or destructive. They may also necessitate a complex data analysis, significantly increasing the experimental time and add unwanted delays in process monitoring, where delays can incur in significant costs. Advances in thermochemical and spectroscopic techniques have enabled the screening of thousands of plants for different phenotypes, such as cell-wall cellulose, non-cellulosic polysaccharide, and lignin composition, lignin monomer composition, or monomeric sugar release. Some instrumental methods have been coupled with multivariate analysis, providing elegant chemometric predictive models enabling the accelerated identification of potential feedstocks. In addition to the use of high-throughput analytical methods for the characterization of feedstocks based on phenotypic metrics, rapid instrumental techniques have been developed for the real-time monitoring of diverse processes, such as the efficacy of a specific pretreatment strategy, or the formation of end products, such as biofuels and biomaterials. Real-time process monitoring techniques are needed for all stages of the feedstocks-to-biofuels conversion process in order to maximize efficiency and lower costs by monitoring and optimizing performance. These approaches allow researchers to adjust experimental conditions during, rather than at the conclusion, of a process, thereby decreasing overhead expenses. This Frontiers Research Topic explores options for the modification of biomass composition and the conversion of these feedstocks into biofuels or biomaterials and the related innovations in methods for the analysis of the composition of plant biomass, and advances in assessing up- and downstream processes in real-time. Finally, a review of the computational models available for techno-economic modeling and lifecycle analysis will be presented.

Iterative Multiscale Methods for Process Monitoring Feb 12 2021

[Statistical Process Monitoring Using Advanced Data-Driven and Deep Learning Approaches](#) Jun 18

2021 Statistical Process Monitoring Using Advanced Data-Driven and Deep Learning Approaches tackles multivariate challenges in process monitoring by merging the advantages of univariate and traditional multivariate techniques to enhance their performance and widen their practical applicability. The book proceeds with merging the desirable properties of shallow learning approaches - such as a one-class support vector machine and k-nearest neighbours and unsupervised deep learning approaches - to develop more sophisticated and efficient monitoring techniques. Finally, the developed approaches are applied to monitor many processes, such as waste-water treatment plants, detection of obstacles in driving environments for autonomous robots and vehicles, robot swarm, chemical processes (continuous stirred tank reactor, plug flow reactor, and distillation columns), ozone pollution, road traffic congestion, and solar photovoltaic systems. Uses a data-driven based approach to fault detection and attribution Provides an in-depth understanding of fault detection and attribution in complex and multivariate systems Familiarises you with the most suitable data-driven based techniques including multivariate statistical techniques and deep learning-based methods Includes case studies and comparison of different methods

Artifact-Driven Business Process Monitoring May 30 2022 This book proposes a novel technique, named artifact-driven process monitoring, by which multi-party processes, involving non-automated activities, can be continuously and autonomously monitored. This technique exploits the Internet of Things (IoT) paradigm to make the physical objects, participating in a process, smart. Being equipped with sensors, a computing device, and a communication interface, such smart objects can then become self-aware of their own conditions and of the process they participate in, and exchange this information with the other smart objects and the involved organizations. To allow organizations to reuse preexisting process models, a method to instruct smart objects given Business Process Model and Notation (BPMN) collaboration diagrams is also presented. The work constitutes a revised version of the PhD dissertation written by the author at the PhD School of Information

Engineering of Politecnico di Milano, Italy. In 2019, the PhD dissertation won the “CAiSE PhD award”, granted to outstanding PhD theses in the field of Information Systems Engineering.

Plug-and-Play Monitoring and Performance Optimization for Industrial Automation

Processes Jan 02 2020 Dr.-Ing. Hao Luo demonstrates the developments of advanced plug-and-play (PnP) process monitoring and control systems for industrial automation processes. With aid of the so-called Youla parameterization, a novel PnP process monitoring and control architecture (PnP-PMCA) with modularized components is proposed. To validate the developments, a case study on an industrial rolling mill benchmark is performed, and the real-time implementation on a laboratory brushless DC motor is presented.

Chemical Process Performance Evaluation Oct 30 2019 The latest advances in process monitoring, data analysis, and control systems are increasingly useful for maintaining the safety, flexibility, and environmental compliance of industrial manufacturing operations. Focusing on continuous, multivariate processes, Chemical Process Performance Evaluation introduces statistical methods and modeling techniques for process monitoring, performance evaluation, and fault diagnosis. This book introduces practical multivariate statistical methods and empirical modeling development techniques, such as principal components regression, partial least squares regression, input-output modeling, state-space modeling, and modeling process signals for trend analysis. Then the authors examine fault diagnosis techniques based on episodes, hidden Markov models, contribution plots, discriminant analysis, and support vector machines. They address controller process evaluation and sensor failure detection, including methods for differentiating between sensor failures and process upset. The book concludes with an extensive discussion on the use of data analysis techniques for the special case of web and sheet processes. Case studies illustrate the implementation of methods presented throughout the book. Emphasizing the balance between practice and theory, Chemical Process Performance Evaluation is an excellent tool for comparing alternative techniques for process monitoring, signal modeling, and process diagnosis. The unique integration of process and controller monitoring and fault diagnosis facilitates the practical implementation of unified and automated monitoring and diagnosis technologies.

Data-Driven Fault Detection and Reasoning for Industrial Monitoring Sep 21 2021 This open access book assesses the potential of data-driven methods in industrial process monitoring engineering. The process modeling, fault detection, classification, isolation, and reasoning are studied in detail. These methods can be used to improve the safety and reliability of industrial processes. Fault diagnosis, including fault detection and reasoning, has attracted engineers and scientists from various fields such as control, machinery, mathematics, and automation engineering. Combining the diagnosis algorithms and application cases, this book establishes a basic framework for this topic and implements various statistical analysis methods for process monitoring. This book is intended for senior undergraduate and graduate students who are interested in fault diagnosis technology, researchers investigating automation and industrial security, professional practitioners and engineers working on engineering modeling and data processing applications. This is an open access book.

Analyzing Costs, Procedures, Processes, and Outcomes in Human Services Aug 09 2020 The examples are designed to encourage readers to explore the concepts and techniques by conducting their own quantitative and qualitative analyses of cost, procedure, process, and outcome paths in human services.

Data Analysis and Applications 3 Nov 11 2020 Data analysis as an area of importance has grown exponentially, especially during the past couple of decades. This can be attributed to a rapidly growing computer industry and the wide applicability of computational techniques, in conjunction with new advances of analytic tools. This being the case, the need for literature that addresses this is self-evident. New publications are appearing, covering the need for information from all fields of science and engineering, thanks to the universal relevance of data analysis and statistics packages. This book is a collective work by a number of leading scientists, analysts, engineers, mathematicians and statisticians who have been working at the forefront of data analysis. The chapters included in

this volume represent a cross-section of current concerns and research interests in these scientific areas. The material is divided into two parts: Computational Data Analysis, and Classification Data Analysis, with methods for both - providing the reader with both theoretical and applied information on data analysis methods, models and techniques and appropriate applications.

Fault Diagnosis and Detection May 18 2021 Mass production companies have become obliged to reduce their production costs and sell more products with lower profit margins in order to survive in competitive market conditions. The complexity and automation level of machinery are continuously growing. This development calls for some of the most critical issues that are reliability and dependability of automatic systems. In the future, machines will be monitored remotely, and computer-aided techniques will be employed to detect faults in the future, and also there will be unmanned factories where machines and systems communicate to each other, detect their own faults, and can remotely intercept their faults. The pioneer studies of such systems are fault diagnosis studies. Thus, we hope that this book will contribute to the literature in this regard.

Statistical Process Monitoring and Optimization Apr 28 2022 Demonstrates ways to track industrial processes and performance, integrating related areas such as engineering process control, statistical reasoning in TQM, robust parameter design, control charts, multivariate process monitoring, capability indices, experimental design, empirical model building, and process optimization. The book covers a range of statistical methods and emphasizes practical applications of quality control systems in manufacturing, organization and planning.

Solid State Development and Processing of Pharmaceutical Molecules Mar 16 2021 Solid State Development and Processing of Pharmaceutical Molecules A guide to the latest industry principles for optimizing the production of solid state active pharmaceutical ingredients Solid State Development and Processing of Pharmaceutical Molecules is an authoritative guide that covers the entire pharmaceutical value chain. The authors—noted experts on the topic—examine the importance of the solid state form of chemical and biological drugs and review the development, production, quality control, formulation, and stability of medicines. The book explores the most recent trends in the digitization and automation of the pharmaceutical production processes that reflect the need for consistent high quality. It also includes information on relevant regulatory and intellectual property considerations. This resource is aimed at professionals in the pharmaceutical industry and offers an in-depth examination of the commercially relevant issues facing developers, producers and distributors of drug substances. This important book: Provides a guide for the effective development of solid drug forms Compares different characterization methods for solid state APIs Offers a resource for understanding efficient production methods for solid state forms of chemical and biological drugs Includes information on automation, process control, and machine learning as an integral part of the development and production workflows Covers in detail the regulatory and quality control aspects of drug development Written for medicinal chemists, pharmaceutical industry professionals, pharma engineers, solid state chemists, chemical engineers, Solid State Development and Processing of Pharmaceutical Molecules reviews information on the solid state of active pharmaceutical ingredients for their efficient development and production.

Statistical Monitoring of Complex Multivariate Processes Feb 24 2022 The development and application of multivariate statistical techniques in process monitoring has gained substantial interest over the past two decades in academia and industry alike. Initially developed for monitoring and fault diagnosis in complex systems, such techniques have been refined and applied in various engineering areas, for example mechanical and manufacturing, chemical, electrical and electronic, and power engineering. The recipe for the tremendous interest in multivariate statistical techniques lies in its simplicity and adaptability for developing monitoring applications. In contrast, competitive model, signal or knowledge based techniques showed their potential only whenever cost-benefit economics have justified the required effort in developing applications. Statistical Monitoring of Complex Multivariate Processes presents recent advances in statistics based process monitoring, explaining how these processes can now be used in areas such as mechanical and manufacturing engineering for example, in addition to the traditional chemical industry. This book: Contains a

detailed theoretical background of the component technology. Brings together a large body of work to address the field's drawbacks, and develops methods for their improvement. Details cross-disciplinary utilization, exemplified by examples in chemical, mechanical and manufacturing engineering. Presents real life industrial applications, outlining deficiencies in the methodology and how to address them. Includes numerous examples, tutorial questions and homework assignments in the form of individual and team-based projects, to enhance the learning experience. Features a supplementary website including Matlab algorithms and data sets. This book provides a timely reference text to the rapidly evolving area of multivariate statistical analysis for academics, advanced level students, and practitioners alike.

Novel Methods for Monitoring and Managing Land and Water Resources in Siberia Aug 28 2019 This book presents an analysis of land and water resources in Siberia, initially characterizing the landscapes, their ecosystems, crucial processes, human impacts on soil and water quality, and the status quo of available research. Further chapters deal with modern monitoring and management methods that can lead to a significant knowledge shift and initiate sustainable soil and water resources use. These include soil hydrological laboratory measurement methods; process-based field evaluation methods for land and water quality; remote sensing and GIS technology-based landscape monitoring methods; process and ecosystem modeling approaches; methods of resource and process evaluation and functional soil mapping; and tools for controlling agricultural land use systems. More than 15 of these concrete monitoring and management tools can immediately be incorporated into research and practice. Maintaining the functions of great landscapes for future generations will be the reward for these efforts.

Bayesian Process Monitoring, Control and Optimization Jun 26 2019 Although there are many Bayesian statistical books that focus on biostatistics and economics, there are few that address the problems faced by engineers. Bayesian Process Monitoring, Control and Optimization resolves this need, showing you how to oversee, adjust, and optimize industrial processes. Bridging the gap between application and development, this reference adopts Bayesian approaches for actual industrial practices. Divided into four parts, it begins with an introduction that discusses inferential problems and presents modern methods in Bayesian computation. The next part explains statistical process control (SPC) and examines both univariate and multivariate process monitoring techniques. Subsequent chapters present Bayesian approaches that can be used for time series data analysis and process control. The contributors include material on the Kalman filter, radar detection, and discrete part manufacturing. The last part focuses on process optimization and illustrates the application of Bayesian regression to sequential optimization, the use of Bayesian techniques for the analysis of saturated designs, and the function of predictive distributions for optimization. Written by international contributors from academia and industry, Bayesian Process Monitoring, Control and Optimization provides up-to-date applications of Bayesian processes for industrial, mechanical, electrical, and quality engineers as well as applied statisticians.

Implementation Monitoring and Process Evaluation Jan 14 2021 Implementation Monitoring and Process Evaluation by Ruth P. Saunders is a practical guide that helps readers understand and use the steps that program planners and evaluators take in implementing and monitoring a new program, policy, or practice in an organizational setting. The book covers the entire process, from planning, to carrying out the plan, and summarizing, reporting, and using the results. A wide range of real-world examples in the book are drawn from health, education, non-profit organizations, and public administration, and an extended case study, Your Turn boxes, and worksheet templates help readers apply concepts to their own projects. Ideal for practitioners, researchers, and students, this book can be used as a primary text for a process evaluation or an implementation monitoring course or as a supplemental text in a broader program evaluation course.

Bayesian Process Monitoring, Control and Optimization Jun 30 2022 Although there are many Bayesian statistical books that focus on biostatistics and economics, there are few that address the problems faced by engineers. Bayesian Process Monitoring, Control and Optimization resolves this need, showing you how to oversee, adjust, and optimize industrial processes. Bridging the gap

between application and development, this reference adopts Bayesian approaches for actual industrial practices. Divided into four parts, it begins with an introduction that discusses inferential problems and presents modern methods in Bayesian computation. The next part explains statistical process control (SPC) and examines both univariate and multivariate process monitoring techniques. Subsequent chapters present Bayesian approaches that can be used for time series data analysis and process control. The contributors include material on the Kalman filter, radar detection, and discrete part manufacturing. The last part focuses on process optimization and illustrates the application of Bayesian regression to sequential optimization, the use of Bayesian techniques for the analysis of saturated designs, and the function of predictive distributions for optimization. Written by international contributors from academia and industry, *Bayesian Process Monitoring, Control and Optimization* provides up-to-date applications of Bayesian processes for industrial, mechanical, electrical, and quality engineers as well as applied statisticians.

Intelligent Process Monitoring and Control Using Sensor Data Jul 20 2021 The availability of advanced information technologies such as the various types of automatic data acquisitions and sensor systems has created a tremendous capability to collect valuable process data. The effective and timely processing of this data is the backbone of intelligent process monitoring and control. The need for more practical process monitoring models continues to grow as these technologies become more sophisticated. This book presents effective methods for processing sensor data in order to achieve intelligent process monitoring and control strategies. In developing these methods, the following issues were considered: (a) how to represent secondary data in such a way that the features conserve the condition information essential for real-time decisions; (b) how to obtain a set of parsimonious features that are able to capture new information and also preserve the condition information in the original data; and (c) how to reduce the uncertainty in selecting subset features for prediction purposes. The book is an indispensable resource for researchers, professionals, and graduate students in industrial engineering, manufacturing, and related fields of study.

Measurement, Monitoring, Modelling and Control of Bioprocesses Jul 28 2019 Automated Measurement and Monitoring of Bioprocesses: Key Elements of the M3C Strategy, by Bernhard Sonnleitner Automatic Control of Bioprocesses, by Marc Stanke, Bernd Hitzmann An Advanced Monitoring Platform for Rational Design of Recombinant Processes, by G. Striedner, K. Bayer Modelling Approaches for Bio-Manufacturing Operations, by Sunil Chhatre Extreme Scale-Down Approaches for Rapid Chromatography Column Design and Scale-Up During Bioprocess Development, by Sunil Chhatre Applying Mechanistic Models in Bioprocess Development, by Rita Lencastre Fernandes, Vijaya Krishna Bodla, Magnus Carlquist, Anna-Lena Heins, Anna Eliasson Lantz, Gürkan Sin and Krist V. Gernaey Multivariate Data Analysis for Advancing the Interpretation of Bioprocess Measurement and Monitoring Data, by Jarka Glassey Design of Pathway-Level Bioprocess Monitoring and Control Strategies Supported by Metabolic Networks, by Inês A. Isidro, Ana R. Ferreira, João J. Clemente, António E. Cunha, João M. L. Dias, Rui Oliveira Knowledge Management and Process Monitoring of Pharmaceutical Processes in the Quality by Design Paradigm, by Anurag S Rathore, Anshuman Bansal, Jaspinder Hans The Choice of Suitable Online Analytical Techniques and Data Processing for Monitoring of Bioprocesses, by Ian Marison, Siobhán Hennessy, Róisín Foley, Moira Schuler, Senthilkumar Sivaprakasam, Brian Freeland

Assessment of the State-Of-The-Art for Process Monitoring Sensors for Polymer Composites Apr 04 2020

Food Process Monitoring Systems May 06 2020 The manufacture of foods and beverages is a highly competitive, international industry, and the range of products is becoming increasingly diverse. Manufacturers are required to produce quality foods with the highest possible efficiency and lowest possible cost, and international legislation is imposing strict controls on food safety. Process control is the essential link between quality, safety and cost. Radical changes in the technology of manufacturing bring with them new requirements for monitoring (and ultimately controlling) increasingly complex parameters. The aim of this book is to review the latest developments in monitoring systems, particularly those suitable for the rapid sensing of composition, structure or

microbial status. The emphasis is on 'up and coming' methods that have been proven in the laboratory or in other industrial environments, and offer potential in the food sector. As such, it is hoped that this book will increase the general awareness of what new systems have to offer, and will act as a catalyst in the technology transfer process. The book features chapters on automated machine vision, fluorescence cytometry, infrared spectroscopy, light scattering spectroscopy, ultrasound, mass spectrometry, and chemical and biological sensors. In all cases, the basic approach is to describe the underlying principles, and then to consider the implementation of a particular technique. Examples are given of the practical application to specific problems in the food industry.

Batch Fermentation Mar 04 2020 Illustrating techniques in model development, signal processing, data reconciliation, process monitoring, quality assurance, intelligent real-time process supervision, and fault detection and diagnosis, Batch Fermentation offers valuable simulation and control strategies for batch fermentation applications in the food, pharmaceutical, and chemical industries. The book provides approaches for determining optimal reference trajectories and operating conditions; estimating final product quality; modifying, adjusting, and enhancing batch process operations; and designing integrated real-time intelligent knowledge-based systems for process monitoring and fault diagnosis.

Process Monitoring, Diagnostics and Prognostics in Machining Processes Oct 23 2021 Condition-Based Maintenance (CBM) technology increases system availability and safety while reducing costs, attributed to reduced maintenance and inventory, increased capacity, and enhanced logistics and supply chain performance. Employing effective generic process monitoring methods for abrupt failures and diagnostics and prognostics algorithms for incipient failures is an important prerequisite for widespread deployment of CBM. Diagnostics is the process of identifying, localizing and determining severity of a machine failure, whereas prognostics is the process of estimating the remaining-useful-life (RUL). This work presents methods based on support vector machines and hidden Markov models to diagnose abrupt and incipient failures and to estimate the RUL. The presented methods have the ability to handle non-stationary processes. There exist three major goals of this work: detecting abrupt failures (process monitoring), identifying the state of incipient failures (health state estimation) and estimating RUL of the machine (prognostics).

Monitoring the Winemaking Process from Grapes to Wine Sep 29 2019 Presents procedures and guidelines for operations and tests conducted throughout the winemaking process.