The Open Access Journal of Science and Technology

Editorial

Material Science Webinar-Announcement

International Webinar on material science and engineering is going to be held during December 24, 2020, from 9A.M GMT. Materials Science and Engineering Webinar 2019 was one of the most successful conferences in the past and now we again give you people the opportunity to be a part of this conference and share your knowledge cordially, contributing towards the success of the Webinar in 2019. So, we delightfully invite you to joins us again for Material Science Webinar and share your knowledge and experience on our global platform. It is a study of application of material manufacture or construction. The knowledge domain field of materials science additionally termed materials science and engineering, is that the style and discovery of latest materials, significantly solids.

Keywords

Material Science and Engineering Webinar ,Material Science and Engineering ,Material Science and Engineering Summit 2020 , Material Science and Engineering Innovations ,Material Science and Engineering 2021 , Material Science and Engineering workshops 2020, Material Science and Engineering Webinar 2020 , Biopolymer conferences ,Material Science and Engineering 2020

Session 1: Hybrid polymer-based materials

An oversized variety of the polymers that we all know concerning from our regular day to day existences area unit referred to as plastics. The plastics, or thermoplastics, area unit polymers that soften once warm and area unit formed into numerous structures. Fibres incorporate varied styles of designed yarn or rope that area unit created victimization amorphous materials, as an example, the polyesters. Crystalline polymers will likewise be used to create filaments that are found in bullet resistant consumer goods. Polymer exercise is associate degree approach to decrease natural problems caused by compound waste aggregation created from everyday utilizations of chemical compound materials like construction and development. The reusing of compound waste saves natural resources as giant portion of chemical compound materials area unit created victimization oil and gas.

Session 2: Smart biomaterials

Biomaterials area unit necessary to the event of various vanguard medical devices and merchandise as well as perishable sutures, bone screws, pins, poles and plates, and scaffolds for ill bone, ligament and blood vessels. The third-generation biomaterials mix the resortable and bioactive property, with the goal of making materials that, once deep-seated, can change the body to heal itself whereas the second-generation biomaterials were designed to be resort able or bioactive. Biomaterials are often reengineered into fashioned or machined components, coatings, filaments, foams and materials to be used in medical specialty devices. These might incorporate heart valves, articulation co substitutions, dental implants, or lens. The perishable and bio-absorbable property of biomaterials created them to disposed of step by step from the body within the wake of fulfilling a operate.

Session 3: Chemical Biology

Chemical Biology is a relatively new field which involves both Chemistry and Biology. It includes a wide range of techniques, tools that are used to study biological systems. This field differs from biochemistry which studies the chemical reactions and molecular structure of compounds inside living organisms. Chemical biology on the other hand involves stimulating biological systems using chemicals. One example of chemical biology is the potential use of stem cells. Stem cells have the potential to cause rapid production of cells of any type in the human body. Stem cells can be used to regenerate damaged organs, tissues and in the treatment of cancer. Chemical biology has the potential to control stem cells by removing certain compounds which shall cause them to react differently.

Session 4: Organic Chemistry

Organic Chemistry studies the structure, properties and behaviour of compounds containing carbon-hydrogen bonds. Sometimes organic and inorganic chemistry overlap in some research subject areas but overall they are different. Most biological chemicals generated by plants and animals are organic in nature and have carbon-hydrogen bond. Organic compounds can contain a few atoms to extremely long polymer chains of molecules where thousands of atoms form one molecule.

The Open Access Journal of Science and Technology

Editorial

Material Science -Past Webinar Report

International Webinar on material science and engineering is going to be held during October 15, 2020, from 9A.M GMT. Materials Science and Engineering Webinar 2020 was one of the most successful conferences in the past and now we again give you people the opportunity to be a part of this conference and share your knowledge cordially, contributing towards the success of the Webinar in 2019. So, we delightfully invite you to joins us again for Material Science Webinar and share your knowledge and experience on our global platform. It is a study of application of material manufacture or construction. The knowledge domain field of materials science additionally termed materials science and engineering, is that the style and discovery of latest materials, significantly solids.

Keywords

Material Science and Engineering Webinar ,Material Science and Engineering ,Material Science and Engineering Summit 2020 , Material Science and Engineering Innovations ,Material Science and Engineering 2021 , Material Science and Engineering workshops 2020, Material Science and Engineering Webinar 2020 , Biopolymer conferences ,Material Science and Engineering 2020

Session 1: Hybrid polymer-based materials

An oversized variety of the polymers that we all know concerning from our regular day to day existences area unit referred to as plastics. The plastics, or thermoplastics, area unit polymers that soften once warm and area unit formed into numerous structures. Fibres incorporate varied styles of designed yarn or rope that area unit created victimization amorphous materials, as an example, the polyesters. Crystalline polymers will likewise be used to create filaments that are found in bullet resistant consumer goods. Polymer exercise is associate degree approach to decrease natural problems caused by compound waste aggregation created from everyday utilizations of chemical compound materials like construction and development. The reusing of compound waste saves natural resources as giant portion of chemical compound materials area unit created victimization oil and gas.

Session 2: Smart biomaterials

Biomaterials area unit necessary to the event of various vanguard medical devices and merchandise as well as perishable sutures, bone screws, pins, poles and plates, and scaffolds for ill bone, ligament and blood vessels. The third-generation biomaterials mix the resortable and bioactive property, with the goal of making materials that, once deep-seated, can change the body to heal itself whereas the second-generation biomaterials were designed to be resort able or bioactive. Biomaterials are often reengineered into fashioned or machined components, coatings, filaments, foams and materials to be used in medical specialty devices. These might incorporate heart valves, articulation co substitutions, dental implants, or lens. The perishable and bio-absorbable property of biomaterials created them to disposed of step by step from the body within the wake of fulfilling a operate.

Session 3: Chemical Biology

Chemical Biology is a relatively new field which involves both Chemistry and Biology. It includes a wide range of techniques, tools that are used to study biological systems. This field differs from biochemistry which studies the chemical reactions and molecular structure of compounds inside living organisms. Chemical biology on the other hand involves stimulating biological systems using chemicals. One example of chemical biology is the potential use of stem cells. Stem cells have the potential to cause rapid production of cells of any type in the human body. Stem cells can be used to regenerate damaged organs, tissues and in the treatment of cancer. Chemical biology has the potential to control stem cells by removing certain compounds which shall cause them to react differently.

Session 4: Organic Chemistry

Organic Chemistry studies the structure, properties and behaviour of compounds containing carbon-hydrogen bonds. Sometimes organic and inorganic chemistry overlap in some research subject areas but overall they are different. Most biological chemicals generated by plants and animals are organic in nature and have carbon-hydrogen bond.

The Open Access Journal of Science and Technology

Abstract

Laser polishing and structuring of tooling and functional surfaces

Evgueni Bordatchev

Senior Research Officer National Research Council of Canada,Canada

Abstract:

Since its inception, laser polishing (LP) technology has been receiving an increasing attention as a plausible alternative to the conventional polishing techniques. The main driver behind the development of LP technology resides in the fact that >40% of the tooling cost is associated with high-cost and time-consuming manual polishing. By contrast, LP can significantly reduce these costs by the high level of automation and the precision provided through its coupling with CNC technology. Considering its potential applications in automotive, aerospace and biomedical industries, the Automotive Portfolio of the National Research Council (NRC), Canada has been actively engaged in the development of LP technology. Building on this activity, the main objective of the present report is to introduce some of the achievements and developments of LP technology at NRC over the past five years. This presentation will focus on detail description of the laser-based Â polishing and surface functionalization processes, their advantages and disadvantages with respect to the conventical abrasive polishing techniques, and examples of LP process technical implementations along with examples of LPed parts and functional surfaces, e.g. for controlled wettability, friction, adhesion, drag, and hydro-/aerodynamics. Then common understanding the process physics, process classification and its variants, material and surface characterization, and modeling capability will be presented. In addition, effect of most critical process parameters, laser type and characteristics, laser path trajectory, and process planning methodologies on achieved surface quality and physical-mechanical characteristics, e.g. gloss, micro-hardness, metallographic structures, corrosion resistance and others. Along these lines, a statistical digital twin of the laser micro-polishing process will be introduced as a thermodynamic transfer function with associated thermophysical model of the rapid melting-solidification of H13 tool steel as induced by continuous wave laser irradiation. In addition, the multi-process laser melting-based processing system will be analyzed from the perspective of Industry 4.0 integration. This avenue will be explored to better understand the possibility to couple the statistical digital twin of the LP process with the existing built-in sensing capabilities of the laser processing system (e.g. high-speed thermographic imaging), an effort regarded as the stepping stone towards the future additions of artificial intelligence, machine learning, multi-objective optimization, predictive control, and other aspects of smart manufacturing. Special attention will be placed on technical applications of the LP process in manufacturing tooling, molds and dies, medical implants, additive manufactured parts, optics, and others. The presentation will conclude with techno-economic analysis of the LP implementation, an outlook on the future of the technology, and technical and knowledge gaps that still need to be filled.

Biography:

Evgueni Bordatchev is a Senior Research Officer and a Team Leader for Microfabrication and Surface Functionalization group at the National Research Council of Canada, in London, Ontario, Canada. He received Master, PhD, and Doctor of Technical Science degrees in electro-mechanical engineering from Don State Technical University, Rostov-on-Don, Russia, in 1982, 1989 and 1996, respectively. Since 1998, he is with National Research Council demonstrating his national and international recognition as an expert in laser- and cutting-based high-precision micromachining, surface functionalization, laser polishing, micro/nano-optics,micro-opto-electro-mechanical systems/sensors, and micro-moulds/dies.

Publication of speakers:

- Performance of laser polishing in finishing of metallic surfaces
- Porosity and cutting forces: from macroscale to microscale machining correlations
- Influence of overlap between the laser beam tracks on surface quality in laser polishing of AISI H13 tool steel
- A fast-response thin film thermocouple to measure rapid surface temperature changes
- Neural network modeling and analysis of the material removal process during laser machining

International Webinar on material science and engineering, December 24, 2020

Citation: Laser polishing and structuring of tooling and functional surfaces, Evgueni Bordatchev, Senior Research Officer National Research Council of Canada, and Canada.

The Open Access Journal of Science and Technology

Abstract

Engineered Functional Surfaces by Laser Micro Processing

Guan Yingchun

Beihang University, China

Abstract:

Laser Micro Processing has been considered as promising technique to enhance surface performance of materials or components in various applications including aerospace manufacturing and biomedical devices. This talk will present recent work of laser surface techniques including cleaning, polishing, and texturing on various substrates in our group. How the surfaces could be manipulated at various scales to obtain specific properties will also be elaborated on.

Biography:

Guan Yingchun CEng (TWI) is a Full Professor of material processing who is director of multiscale laser manufacturing center at Beihang University. She has made several contributions in areas of laser material processing over the last dozen years, and her work has affected precision engineering and surface technology.

Publication of speakers:

- Laser polishing of additive manufactured Ti alloys
- Effect of laser surface melting on corrosion behavior of AZ91D Mg alloy in simulated-modified body fluid.

- Study on the solidification microstructure in AZ91D Mg alloy after laser surface melting
- Laser surface cleaning of carbonaceous deposits on diesel engine piston
- Solidification microstructure of AZ91D Mg alloy after laser surface melting

International Webinar on material science and engineering, December 24, 2020

Citation: Engineered Functional Surfaces by Laser Micro Processing, Guan Yingchun,Beihang University, China

The Open Access Journal of Science and Technology

Abstract

Fabrication of micro/Nano structures by hybrid process with short-pulsed laser and machining

Shuhei Kodama

Tokyo University of Agriculture and Technology

Abstract:

Laser-induced periodic surface structures (LIPSS) have been studied to alter surface functions such as tribology, wettability, optical properties and bio affinity. However, this method has difficulty in control of LIPSS since the principles and the phenomena have not been clarified completely. It has been reported that LIPSS follow debris on a material surface due to the incidence and propagation of plasma waves improved by debris, hence, the short-pulsed laser (SPL) assisted by mechanical processing was proposed to control LIPSS, and the effects of the surface geometry before laser irradiation on LIPSS were investigated. The use of magnetic abrasive finishing and precision cutting is proposed to create micro/nano-grooves prior to the short-pulsed-laser irradiation. The subsequent laser irradiation fabricated straight LIPSS with high aspect ratio on the processed surfaces. The surface geometry prior to the short-pulsed laser irradiation is the dominant factor in determining the geometry of the LIPSS. On the other hand, an SPL capable of fabricating nanostructures is unstable for the creation of large scale shapes. The appropriate processing method depends on the scale of the demanded shape and structure, and it takes long processing time with the complicated process to create the shape and fabricate nanostructures on the surface. The hybrid manufacturing process with an SPL and electrochemical machining (ECM) was also proposed to fabricate multiscale structures effectively, that an SPL increasing electric filed intensity enables ECM to improve the processing speed and fabrication of nanostructures on the electrochemical machined surface. The effects of the hybrid process with an SPL and ECM on the fabrication of multistate structures were investigated experimentally, and the proposed method improved processing speed and fabricated multi-scale structures.

Biography:

Shuhei Kodama has completed his PhD at the age of 27 years from Tohoku University. He is an Assistant Professor of Tokyo

University of Agriculture and Technology. His research activities focus on short-pulsed laser-induced periodic surface structures (SPLIPSS) to clarify principles and phenomena, to control LIPSS and to provide a material surface with various functionalities such as reduction of friction, water repellency, anti-reflection and bioaffinity. He gave 9 presentations and 3 lectures about SPLIPSS at international and domestic conferences, and published 6 papers in reputed journals. He is passionate about precision processing

Publication of speakers:

- Effects of Pulse Duration and Heat on Laser-Induced Periodic Surface Structures
- Study on the Creation of Fine Periodic Structure on V-Shaped Groove with Short-Pulsed Laser
- Control of short-pulsed laser induced periodic surface structures with machining -picosecond laser nanotexturing with magnetic abrasive finishing.
- Effect of Crystal Structure on Fabrication of Fine Periodic Surface Structures with Short Pulsed Laser
- Control of short-pulsed laser induced periodic surface structures with machining - Picosecond laser micro/nanotexturing with ultraprecision cutting

International Webinar on material science and engineering, December 24, 2020

Citation: Fabrication of micro/Nano structures by hybrid process with short-pulsed laser and machining,Shuhei Kodama, Tokyo University of Agriculture and Technology