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International Conference on Materials and Spectroscopy

Dear Distinguish Delegates, Guests and Readers,

It's our immense pleasure to introduce the proceedings of **International Conference on Materials and Spectroscopy (ICMS)** held on **11-12th December, 2018** at Saveetha Engineering College, Chennai, Tamil Nadu (India). ICMS'2018 conference mainly aims for the research area of Materials Science and Spectroscopy applications. With the joint efforts ***Bharath University (BIHER)*** and ***Saveetha Engineering College*** of ICMS'2018 all conference committees, there are more than 100 participants all over the world to attend this event. For this conference, we invited domestic and overseas well-known Materials Scientist and Nanotechnologist to share experience on relevant Nanoscience and Spectroscopy. The whole conference process was separated in two parts: Keynote lecture, oral, and poster presentations.

The major goal and feature of the conference was to bring academic scientists, engineers, industry researchers together to exchange and share their experiences and research results, and discuss the practical challenges encountered and the solutions adopted. Professors from *Federal University of Rio de Jaireiro, Brazil* was invited to deliver keynote speech regarding the latest information in his respective expertise areas.

These proceedings present a selection from papers submitted to the conference from several universities, research institutes and industries. All of the papers were subjected to peer-review by conference committee members and international reviewers. The selected papers depended on their quality and their relevancy to the conference. The volume tends to present to the readers the recent advances in the field of Materials Science and Spectroscopy.

On the conference days, as a Convener of ICMS'2018, I deeply felt the enthusiasm of all participants as the weather in India at Chennai during conference, extremely warm! We also want to express our gratitude to all the members of conference committees, and reviewers who spared their valuable time, for their advice which have certainly contributed to conference for improving the quality, accuracy, relevance and the sincere efforts to maintain the quality of each paper selected for conference program and volume for publication in ***Advanced Materials Proceedings***.

Materials Science *is* a prime source for the best energy-related inter and cross-multi disciplinary research discipline from its roots in solid-state physics, metallurgy, polymer chemistry, inorganic chemistry, mineralogy, glass, and ceramic technology. Of all the disciplines in engineering, Nanotechnology, Spectroscopy and Materials Science Engineering, a relatively unknown field outside of academic circles, faces the unique challenge of attracting new recruits. ICMS'2018 technical contributions were remarkably diverse, spanning such areas as: defects and deformation mechanisms, crystal growth, recrystallization, intermetallic compounds, and metallic glasses. Materials science involves relating the micro/nano-structures of a material to its macromolecular physical and chemical properties. Chemists play a predominant role in materials science because chemistry provides information about the structure and composition of materials, as well as the processes to synthesize and use them. By understanding and then changing the morphologies, material scientists tailor the properties to create custom, or even brand new, materials with specific properties for specific uses. Materials science spans so many different disciplines and applications that people who work in this field tend to specialize in a technique.

Our knowledge of spectroscopy is based on more than 20 years of experimentation in a wide array of disciplines ranging from art to applied physics, Materials Science and Nanotechnology.

However, spectroscopy is used as a tool for studying the structures of nanomaterials. The large number of wavelengths emitted by these systems makes it possible to investigate their structures in detail, including the electronic configurations of ground and various excited states. Spectroscopy also provides a precise analytical method for finding the constituents in a material having the unknown chemical composition and elements.

It is also important that today's science and engineering students will appreciate the capabilities of optical sensing, the fundamental physics of the measurement process, the design trade-offs inherent in selecting and integrating components and the discipline required to produce quality results. The goal of this ICMS'18 proceeding is to provide a vehicle to allow future scientists to study the fundamentals of spectroscopy using modern instrumentation. The exclusive spectroscopic methodologies within analytical chemistry include;

1. Infrared molecular spectroscopy
2. UV-Visible molecular spectrometry. Typical applications in Analytical chemistry for UV- vis. is the quantitative determination of transition metal ions; highly conjugated organic compounds, & biological macromolecules.
3. Fluorescence spectrometry. Used in biochemical analysis.
4. Atomic absorption spectrometry. Utilized for example to measure metals at low concentrations e.g. Calcium in beverages.
5. Atomic Emission Spectroscopy. The Arc & Spark versions of AES are used in steel analysis.
6. Atomic Fluorescence Spectroscopy.
7. Raman Spectroscopy. Used in chemical structure elucidation, & in polymer analysis.
8. Microwave Spectroscopy. Used in atmospheric analysis. e.g. CO_2 level.
9. Near Infrared Spectroscopy. Used in food analysis.
10. Mass spectroscopy. Used to identify organic compounds. Often used as a detector for chromatography e.g. GC-MS. Petroleum analysis.
11. Nuclear Magnetic Resonance spectroscopy. In structure elucidation of organic compounds.
12. C-13 NMR spectroscopy e.g. in polymer analysis, and cosmetics analysis.
13. Solid state NMR Spectroscopy. Medical imaging. Coal, fruit, and plastics analysis.
14. Photoacoustic Spectroscopy. To identify molecules within a solid e.g. Minerals in rock samples. Iron content of whole blood.
15. X-ray Fluorescence Spectroscopy. Identify the elements present in an alloy, and other mixtures.
16. Electron spin resonance spectroscopy. Identify free radicals.
17. X-ray Photoelectron Spectroscopy
18. Auger Electron Spectroscopy
19. Secondary ion mass spectroscopy
20. Extended X ray Absorption Fine Structure

Thus, various spectroscopic investigations in order to create the innovations that sustainable boost the competitiveness of industry and well-being society of Materials Science and Spectroscopy.

With best regards

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