Semblanza Dr. José Bonilla Cruz

Dr. Bonilla-Cruz is Titular-researcher (full-time) in the Centro de Investigación en Materiales Avanzados since 2008. His research is focused on polymer science, graphene-functionalization to be incorporated in polymer nanocomposites, 3D printing of polymers, and polymer (nano)composites. In 2019, he took a Sabbatical stay in CWRU about 3D printing of polymeric materials with Prof. Rigoberto Advincula. His research interests are in the areas of functional polymers synthesis, covalent functionalization of graphene oxide and its polymer composites, as well 3D printing of polymers and composite materials for Advanced Applications in Sensing, Super- Anticorrosive, Supercapacitors, Photocatalysts, CO2 Capture/ reaction, among others. He founded and led the Nano & Micro Additive Manufacturing of Polymers and Composite Materials Laboratory "3D LAB" at CIMAV Monterrey. He is recognized as a member of the National Researchers System (SNII II) from CONACYT-México. He has 55 publications, 7 patents, and 4 book chapters cited over 800 times. Also, he has been chairman and organizer of several national and international meetings of Polymer Science (MACROMEX, Biannual US-Mexico meeting; PPC, Polymer Pacific Conference, among others). Also, he has served as Secretary and President of The Mexican Polymeric Society (SPM).

3D PRINTING OF POLYMERS: CURRENT TRENDS AND ADVANCED APPLICATIONS

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Additive manufacturing (AM), commonly known as 3D printing, represents a transformative technology with significant potential to advance materials science through novel applications across various disciplines. AM enables the development of innovative materials, including resins, inks, powders, and filaments, for various techniques such as digital light processing, stereolithography, two-photon polymerization/multiphoton polymerization, fused deposition modeling, direct ink writing, selective laser sintering/selective laser melting, electrohydrodynamic printing, inkjet printing, among others. These materials encompass polymers, biopolymers, ceramics, metals, and (nano)composites. They are pivotal for advanced applications in energy conversion, environmental remediation, sensors, 4D printing (stimuli-responsive materials), superhydrophobic/oleophobic surfaces, fog harvesting, lightweight structures, tissue engineering, and cell proliferation, among others. Furthermore, integrating artificial intelligence (AI) and machine learning with big data analytics enhances the design and optimization of these materials, accelerating their development and providing deeper insights into the micro- and nanoscopic structure-property relationships of 3D□printed

materials. In this invited Talk, I will cover some current trends and advanced applications of 3D printing focussed on polymer materials.

Keywords: 3D printing, applications, Additive manufacturing Presenting author's

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