A novelty in the current CVD techniques: Plasma radicals assisted polymerization via chemical vapour

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The terrific grown in the last forty years of chemical vapor deposition (CVD) allowed this fabrication process to become as a fundamental element in many industrial products, such as semiconductors, optoelectronics, optics and many others. Despite this strong advance, the technology still faces many challenges and new techniques are developing all around to world. Plasma Radicals Assisted Polymerization via Chemical Vapour Deposition (PRAP-CVD) has been developed at Luxembourg Institute of Science and Technology as an efficient alternative to conventional vapor-based processes of conductive thin films. In PRAP-CVD, oxidative radicals are generated by a remote plasma chamber from a selected initiator and precursor is injected directly in the process chamber. The process is based on the concomitant but physically separated injection of low-energy oxidative radical initiators and vaporized precursor species into the reactor where temperature and pressure are finely controlled. A few advantages of making the process completely dry includes the possibility of processing solvent-sensitive substrates such as paper, overcoming the effects of rinsing on the underlying films in the case of multilayer structures. Moreover, PRAP-CVD allows the deposition of highly conformal coatings, which accurately follows the geometry of the underlying substrate independently from its nature. Poly (3, 4-ethylenedioxythiophene has been chosen as a case study to demonstrate the effectiveness of this technique. In this work, the properties of PRAP-CVD PEDOT films and its applications will be presented.

Speaker Biography

Bianca Rita Pistillo is currently a research and technology associate at Luxembourg Institute of Science and Technology in Luxembourg. She earned her PhD in Chemistry of Innovative Materials at University of Bari (Italy) in 2009. After completing her PhD, she accepted a position as researcher at University of Aldo Moro (Italy), where she worked for 3 years. During that time, she increased her expertise on chemical/morphological surface nanomodification by Chemical Vapour Depositions. In 2012, she accepted to move to LIST jointing the nanomaterials and nanotechnology unit, where she has started to develop a novel technique named Plasma Radicals Assisted Polymerization – CVD, demonstrating as an efficient alternative to conventional vapour based processes. PRAP-CVD is also characterized by a quite unique degree of conformality of deposited films on 3D complex substrates. In 2017, she was awarded the IAAM Scientist Medal by the International Association of Advanced Materials, recognizing her contribution to nanomaterials field.

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