COLD PLASMA PROCESSES FOR SURFACE MODIFICATION OF MATERIALS

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Abstract

Multifunctional effects are essential for producing higher value-added materials, important not only for new technical applications but also for more traditional uses. The dominant role of plasma-treated surfaces in key industrial sectors, such as microelectronics is well known, and plasmas are being used to modify a huge range of material surfaces, including plastics, metals, polymers, papers, food packaging and biomaterials. Cold plasma technologies can induce several surface modifications of materials such as change in surface polarity, grafting of chemicals or deposition of functional coatings [1-3] (Figure 1). The talk will give a comprehensive description and review of the science and technology related to plasmas, with particular emphasis on their potential use in the industry. We will focus on the functionalisation of polymers achieved by means of cold plasma grafting and/or deposition of hydrophilic or hydrophobic coatings, antibacterial, anticorrosion and fire-retardant materials. The grafting and the polymerization of several monomers containing the functional groups needed to impart the needed properties to the materials will be shown. The desired properties are obtained by creating covalent bonds between the substrate and the growing coating on the surface leading to durable effects.

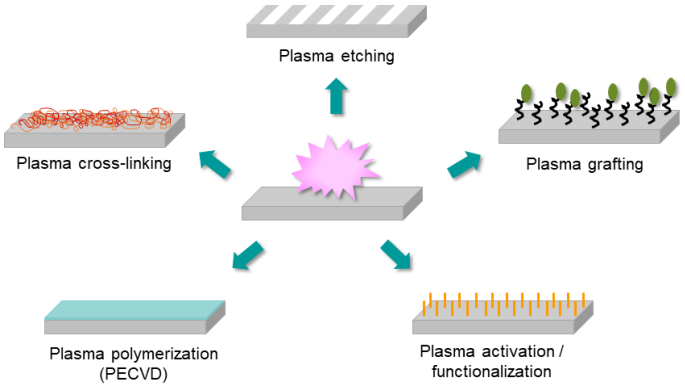

Figure 1: Plasma processes allowing surface modification

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2. S. Bhatt, J. Pulpytel, and F. Aref-Khonsari, "Low and atmospheric plasma polymerisation of nanocoatings for bio-applications," *Surf. Innov.*, vol. 3, no. 2, pp. 63–83, 2015.
3. T. H. Tran, D. Debarnot, J. Ortiz, and F. Poncin-Epaillard, "Role of the surface chemistry of plasma polymer layers on their long-term antifogging behavior," *Plasma Process. Polym.*, vol. 17, no. 4, 2020.

Prof. Charafeddine JAMA presented his PhD thesis at the University of Science and technology of Lille (FRANCE) in Surface modification and thin films elaboration. In 1999, he joined the UMET UMR CNRS 8207 laboratory at Centrale Lille Institute (France) as Professor. He is developing research on surface modification processes for multifunctional materials for anticorrosion, antioxidant and antibacterial applications. He is co-author more than 180 publications (h-index 46), gave around 40 invited-talks in international conferences.