Canadian Association of Physicists
Association canadienne des physiciens et physiciennes

Contribution ID: **3381** Type: **Invited Speaker / Conférencier(ère) invité(e)**

(I) Advanced plasma deposition of organosilicon thin films at atmospheric pressure for innovative eco-friendly devices: tuning the physical mode for different applications

Wednesday, 8 June 2022 11:15 (30 minutes)

Today, many scientific studies made with eco-friendly composites have highlighted the potential to use cellulose- and bio-based materials in different advanced applications. Although these materials could replace oil-based flexible substrates in the next few years, their surface often need to be modified for stability/efficiency or tuning the final properties for a specific purpose. Among the different techniques, plasma processes at atmospheric pressure offers an eco-friendlier, more efficient, and scalable alternative to replace and/or complete classical wet-chemical methods often used in the industry. In this context, several research teams have already studied during the last 50 years plasma-surface interactions as well as the effect of different physical modes occurring at atmospheric pressure (i.e., Filamentary, Townsend, Glow-like, Streamer) on the growth mode and the proprieties of the plasma-treated surfaces. In this study, we report the fragmentation of organosilicon molecules by plasma at atmospheric pressure for different applications. By comparing the physical regimes of the plasma and their relate mechanisms of breakdown, we highlight the possibility to modify the growth mode and the plasma-surface interactions. Similar chemical precursors have been studied to understand the fragmentation processes and affect the final proprieties of the thin plasma-membranes. The obtained results highlight that the physico-chemical processes can be tuned controlling the regime of the ionized gases at atmospheric pressure depending on the intended application (i.e., electrochemical, anti-fog, ice-phobic, barrier). The influence of the substrate's properties, such as the micro- and nano-porosity and the roughness, are studied by SEM to better understand the growth mode of the membrane and the plasma-interface interactions. Organicity levels of the plasma membrane created on the materials in analyzed by ATR-FTIR and XPS.

Primary author: Dr PROFILI, Jacopo (Université Laval)

Presenter: Dr PROFILI, Jacopo (Université Laval)

Session Classification: W1-7 Non-Thermal Plasmas (DPP) | Plasmas non thermiques (DPP)

Track Classification: Technical Sessions / Sessions techniques: Plasma Physics / Physique des plasmas (DPP)