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Plasma polymerization on porous materials: role of sticking coefficients on the penetration depth

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Plasma polymerization applied to the deposition of thin functional coatings on planar substrate reached its maturity because dozens of precursors and plasma conditions have been already tested. Anyway, it is inherently a very complicated process involving a plethora of particle species and numerous effects governing their production, transport, deposition, and possibly etching. For many applications, the substrates are not planar and we can encounter necessity to deposit films inside porous materias. In this paper we highlight some aspects which need to be considered for successful optimization of a low-pressure plasma polymer deposition process on non-planar substrates relevant for bioapplications such as biological tissue cultivation wells, porous scaffold and nanofibrous mats. It is clearly shown on example of cyclopropylamine/argon discharge that geometry different from the standard piece of silicon placed on the electrode changes the film deposition rate and thin film chemistry through altered diffusion pattern and different sticking probabilities of various film forming species.

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