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Plasma in liquid for nanocellulose modification

Sorin Vizireanu¹, Maria Daniela Ionita¹, Eusebiu Rosini Ionita¹, Daniel Silviu Stoica¹,
Lavinia Gabriela Carpen¹, Maximilian Teodorescu¹, Denis Panaitescu², Gheorghe
Dinescu¹

¹I.N.F.L.P.R, Magurele-Bucharest, Romania ²ICECHIM, Bucharest, Romania

s_vizi@infim.ro

Submerged plasmas in liquid have a high applicative potential in decomposition of chemical compounds for waste water decontamination, inactivation of microorganisms, for nanomaterials synthesis, but also for nanomaterials functionalization. Specific chemical reactions may take place at the interface of plasma with liquid media due to presence of electric field, UV radiation, charged particles, excited species, ozone, hydroxyl and peroxide radicals. Bubbling can speed up these reactions.

In the present study we use a submerged plasma jet source, which was previously used for functionalization of graphene dispersion [1], with the aim of modification of nanocellulose suspensions. We used a suspension of 2% nanocellulose in distilled water. The modification of nanocellulose was done by injection in the main Ar discharge of various gases (O₂, N₂ and NH₃), at different ratios, RF power and treatment time. Besides the expected pH decrease of suspension after treatment we studied the chemical surface modification of nanocellulose. The XPS results showed that oxygen and nitrogen containing functional groups were inserted on cellulose in different amounts after plasma in liquid treatment. The treated nanocellulose was used for fabrication of nanocomposites with biopolymer matrices.

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References:

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Keywords

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