

## Sputtering onto liquids for the synthesis of nanoparticles suspensions and beyond

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Magnetron sputter deposition of metal atoms onto vacuum compatible liquids allows producing colloidal solutions of small metal nanoparticles (NPs) without any additional reducing or stabilizing reagents [1]. However, not much is known about plasma – liquid interaction and the parameters governing NPs formation. In this contribution, recent results obtained by varying the plasma and liquid parameters are presented.

The formation of a cloud of particles underneath the oil surface is usually observed while films form in the case of high viscosity oils [2]. The behaviour of the NPs inside the liquid can be monitored in space and time thanks to in situ UV-Vis absorption spectrophotometry [3,4]. The liquid temperature was also measured in situ, highlighting the appearance of a temperature gradient inside the liquid host [5]. The effect of sputtering time and power, argon pressure, type of sputtering plasma (dcMS vs HiPIMS) [6, 7] were also studied taking castor oil, a vegetable liquid, as substrate. Au-NPs have higher stability in castor oil than Ag-NPs but secondary growth processes take place. Interestingly, HiPIMS promotes the formation of NPs larger than those obtained in dcMS mode.

Very recent experiments confirmed the possibility of elaborating hydrogel/nanoparticle composites in a two-step process by choosing an appropriate polymerizable host liquid [8]. Preliminary tests confirm that the as-obtained Ag-Nps/hydrogel can be used to detect mercury cations in aqueous solutions through color change.

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