Silver nanoparticles synthesis *in* Langmuir films

D. R. Assis[*#1], V. N. Ueyama[1], C. C. Santos[2], B.E. Amantéa[2], T.P. Costa[2], M. Jafelicci[2], M. R. Davolos[1]

[1]Laboratory of Luminescent Material, Department of Inorganic Chemistry, Institute of Chemistry, São Paulo State University (Unesp), Araraquara, Brasil
[2]Laboratory of Magnetic Material and Colloids, Department of Physical Chemistry, Institute of Chemistry, São Paulo State University (Unesp), Araraquara, Brasil
[#]Corresponding author: douglasnet9@hotmail.com

Metal nanoparticles organized into thin films give new properties to the materials that can be applied in various applications for example, in fabrication optical devices, the development of sensors and biosensors, for the construction of transistors, memories, and other applications. [1,2]. Langmuir- Blodgett (LB) technique is the most promising method for the production of organized films of surfactants, polymers, and nanoparticles, because it provides good control of the thickness and homogeneity of the monolayer and multilayer [1] The nanoparticulate LB films can be prepared in two ways: (i) deposition of previously synthesized nanoparticles; [2] (ii) synthesis in the interface using surfactants Langmuir film as carriers for the growth of the nanoparticles. The advantage of the second approach is the combination of the synthesis of nanoparticles with the LB film preparation.[3] This work describes the synthesis of Ag nanoparticles in the air-water interface using a Langmuir film of the hydrophobic metalorganic compound. [4] The particles were synthesized in situ in Langmuir through, spreading a mixture of silver sulfadiazine and acid stearic solutions, in chloroform, onto the surface of the sodium borohydride solution used as the subphase. The chemical composition of silver nanoparticles was determined by energy dispersive X-ray spectroscopy attached to the scanning electron microscope operating in scan mode. The scanning electron microscopy images show that silver sulfadiazine is efficient for the LB films formation and they exhibit an organization long range seen in the film samples images field. Results demonstrate that silver sulfadiazine is a precursor reactant and also stabilizes colloidal silver nanoparticles, preventing their aggregation. Conclusion, it was possible to obtain Ag nanoparticles in the air-water interface and organize them for the preparation of LB nanoparticle films.

[1] A. R. Tao, J. Huang, P.Yang, Acc. Chem. Res **41**, (2008) 1662
[2] J. Park et al., J. Phys. Chem. B **109**, (2011)13119
[3] R. C. Sanfelice et al., J. Phys. Chem. C **118**, (2014) 12944
[4] G. B. Khomutov, S. Gubin, Mater. Sci. Eng. C **22**, (2002)141