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(G*) POS-B5 – production of Ag nanoparticles by spark discharge in heptane in contact with solution

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Plasma-liquid systems are significantly investigated due to their high potential in the production of various nanomaterials. In addition to relatively high efficiency and simplified infrastructure, they are ecologic and do not have any risk during handling as they are confined in solution. In this paper, we develop a novel plasma-liquid technique to produce nanoparticles. Indeed, spark discharges are sustained in heptane (a dielectric liquid) and are in contact with a conductive solution. The solution was silver nitrate and distilled water. Due to the interaction between the spark, which has a high density of species, high pressure, and high temperature, and silver ions, these latter are reduced, then they aggregate as nanoparticles.

Liquid samples from both liquids (heptane and solution) were collected and characterized using different techniques. The results show that material collected from the heptane side is nanocomposite, silver nanoparticles (< 10 nm) in carbon matrix; relatively larger (10-45 nm) of Ag embedded in carbon shell were also found in the sample. The sample collected from the solution presents Ag particles with 10-150 nm of diameter. Discharges run at shorter pulse width (100 ns) results in the same material in both liquids, but the size distribution of nanoparticles was relatively smaller.

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