STUDY OF LIQUID PHASE SYNTHESIS OF SILVER NANOWIRES FOR SOLAR CELL APPLICATIONS

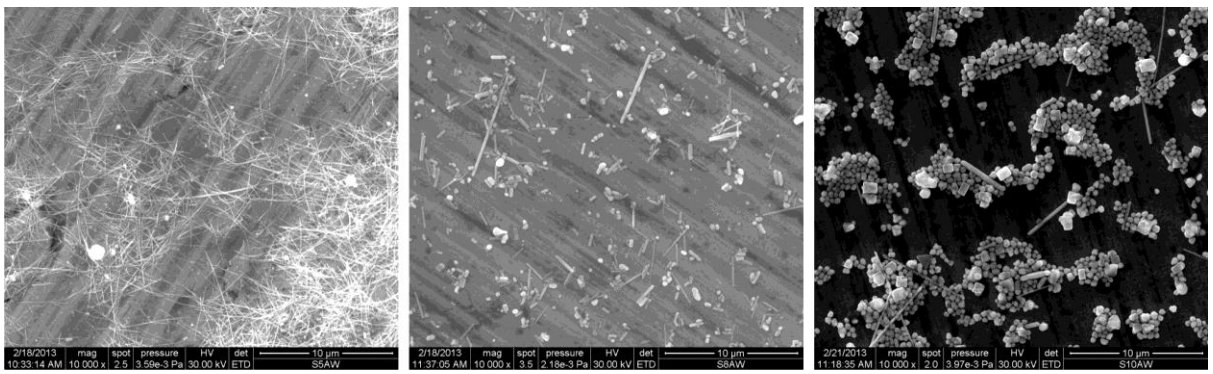
R. Banica[1,2], R. Baies[1,2], R. Bucur[1,2], C. Locovei[1], A. Kellenberger[1], T. Nyari[1,2]*

[1] University "Politehnica" of Timisoara, Piata Victoriei 2, 300006 Timisoara, Romania
[2] National Institute for Research and Development in Electrochemistry and Condensed Matter, Str. Plautius Andronescu 1, 300224 Timisoara, Romania
**E-mail: teriny@gmail.com*

Silver nanowires are promising candidates for the fabrication of indium-free cheap transparent conductive electrodes for flexible electronics, including solar cells. In this work the most important parameters determining the morphology of silver nanoparticles obtained by the "polyol" liquid phase synthesis method were studied, with special emphasis on silver nanowires.

The "polyol" method involves the reduction of Ag^+ ions with polyols at temperatures higher than 130°C. In order to obtain silver nanoparticles with various morphologies (nanowires, nanocubes, nanoprisms, quasi-spheres, etc.) the use of surfactants is necessary [1, 2]. In this study the following synthesis parameters have been varied: the synthesis temperature, the synthesis environment (oxidant and/or inert) as well as the presence of nucleation seeds for induction of heterogeneous nucleation. The obtained silver nanostructures were characterized by X-ray diffraction, UV-Vis spectroscopy, scanning electron microscopy, energy dispersive X- ray analysis and transmission electron microscopy.

The main conclusion after this study is that the solvent temperature and the presence of surfactant at the moment of AgCl clusters formation are determining the morphology of the obtained silver nanostructures. Also, it was found that silver nanowires can be transformed into nanorods or nanoparticles with different shapes by heating the precursors mixture to 160°C (resulting in nanowires formation) followed by a temperature rise to 192°C simultaneously with air bubbling in the suspension of silver nanowires.



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References:

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