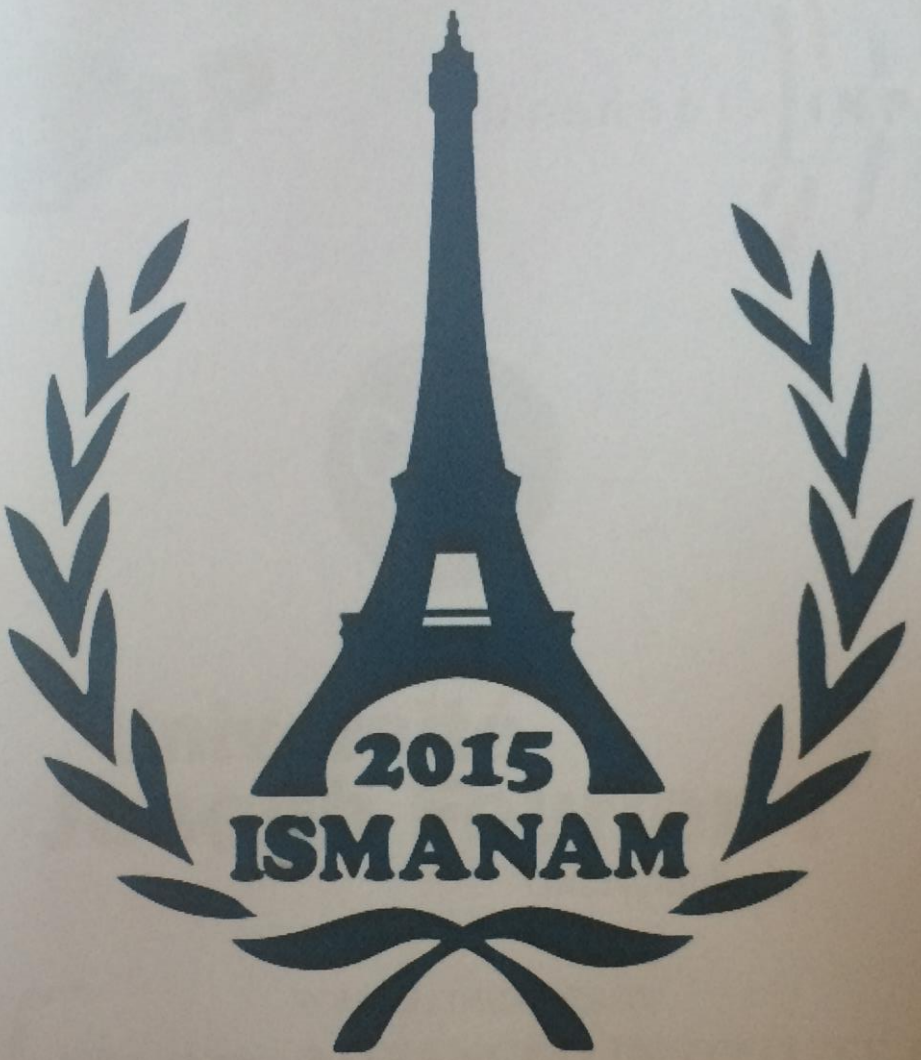
22nd International Symposium on Metastable, Amorphous and Nanostructured Materials



Paris, France

July 13th - 17th, 2015

Organizers

A. R. Yavari and K. Georgarakis

Preparation of Silver Bromide Nanoparticles by Mechanical Activation of the System NaBr – $AgNO_3$ – $NaNO_3$

PS2-067

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In this study, silver bromide nanoparticles have been synthesized using a mechanical activation (**MA**) though replacement reaction $NaBr + AgNO_3 + z^* NaNO_3 = (z^*+1) NaNO_3 + AgBr$ [1]. The MA experiment was conducted for 28 minutes in laboratory planetary mill (Activator 2SL, Russia) at 420 rpm. Calculation of dilution parameter z^* has been shown elsewhere [1]. Silver bromide nanoparticles prepared through MA reaction sodium bromide and silver nitrate were characterized by X-ray diffraction analysis, electron microscopy and dynamic light scattering methods

The experiments and XRD analysis along with TEM examination revealed formation of silver bromide through solid-state chemical reaction by means of mechanochemical processing. Calculated dilution parameter z^* for studied MA reaction were at $z_1 = 8.058$, $z_2 = 4.311$, and for these values the MA reaction proceeded completely with formation of AgBr nanoparticles. The crystallite size (***L***) of AgBr and phase composition estimated from XRD (D8 ADVANCE): at $z^* = z_1$ (L = 70 nm, $NaNO_3$ -82%, AgBr-18%); at $z^* = z_2$ (L = 73 nm, $NaNO_3$ -73%, and AgBr-27 %).

Dynamic light scattering (**DLS**) of MA products showed that the distribution of AgBr nanoparticles in the vicinity of 100 nm at $z^* = z_1$ and 160 nm at $z^* = z_2$, which was confirmed by the data of transmission electron microscopy (**TEM**, JEM-1011). The TEM image (see Figure 1) suggests formation of silver bromide particles with various size distribution lie in the range from 10 nm to 200 nm.

Furthermore, the features of a diluent decomposition into sodium oxide and thermal parameters such as dissociation-sublimation of synthesized AgBr were recorded by thermal analysis (TG/DTA, NETZSCH 449F3A−0372−M). AgBr nanoparticles were isolated in their free form by washing with distilled water from the matrix.

[1] B. Tatykaev, M. Burkitbayev, B. Uralbekov, F. Urakaev, Acta Physica Polonica A 163 (2014) 1044-1048.

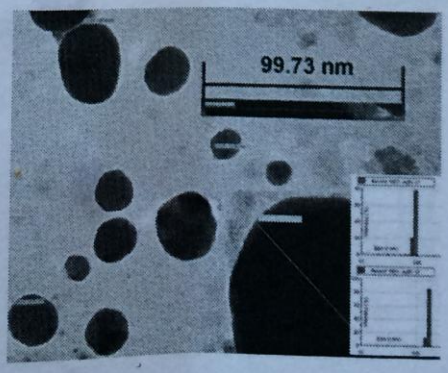

Fig. 1. TEM image at $z^* = z_1$ and DLS size distribution ($z^* = z_1$, $z^* = z_2$) of the AgBr nanoparticles

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Participation Certificate

We hereby certify that

Mr Batukhan Tatykayev

participated in the 22nd International Symposium on Metastable, Amorphous and Nanostructured Materials, held at the Maison de la Mutualité in Paris, France, between 13th and 17th of July 2015.

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