**Effect of diluting agent on the synthesis of silver iodide nanoparticles during co-milling**

B. B. Tatykayev1\*, Zh. S. Shalabayev1, S. B. Tugelbay1, B. M. Uralbekov1, M. M. Burkitbayev1, F. Kh. Urakaev2

*1Al-Farabi Kazakh National University, Al-Farabi av., 71, Almaty 050040, Kazakhstan*

*2SobolevInstitute of Geology and Mineralogy SB RAS, Koptyug av., 3, Novosibirsk 630090, Russia*

*\* The corresponding author e-mail: b.tatykayev@gmail.com*

**Keywords:** silver iodide nanoparticles, diluting agents, co-milling, mechanical activation.

In this study, solid-state ion exchange reaction has been carried out in a planetary ball-mill (Fritsch Pulverisette 6, 400 rpm, 40 min) between ammonium iodide and silver nitrate in the presence of diluting agent by the mechanical activation (**MA**). Furthermore, the influence of diluents on a crystallite size and morphology of silver iodide nanoparticles has been studied, see also [1].

Three different powders such as ammonium nitrate, water-soluble starch and succinic acid were used as the diluting agents. Mass ratio of reagents and diluting compounds were similar in all systems.

X-ray powder diffraction analysis of MA products showed formation of well-established crystallites of the silver iodide’s two different phases: cubic (γ); and hexagonal (β). It has been found that crystallite size of silver iodide nanoparticles as well as their phase ratio depend on the presence of diluent. Obtained results showed that milling with ammonium nitrate, which is one of the final product, resulted in the formation of β−AgI(36.7%) and of γ−AgI(63.3%) having an average crystallite size of 67 nm and 63 nm, respectively. The lowest crystallites size were obtained for the system with water-soluble starch, obtained results for β−AgI(29.6%) is 15 nm and for γ−AgI(70.4%) is 22 nm. Following results were obtained for β−AgI(43.4%) 45 nm and for γ−AgI(56.6%) 46 nm using succinic acid as diluting agent. It can be seen that the pint-sized silver crystallites were determined in final product after MA in the presence of organic dilution agent.

Dynamic light scattering analysis showed agglomeration of silver iodide nanoparticles ranged from 150 nm to 250 nm in all studied systems.

**References**

[1] B.B. Tatykaev, M.M. Burkitbayev, B.M. Uralbekov, F.Kh. Urakaev, Acta Physica Polonica A, 126 (2014) 1044-1048.

**Acknowledgements**

The work is supported by the funding program 0130/PTsF-14 of the Republic of Kazakhstan.