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Structure and Electrokinetic Potential of Nanoporous Glasses Doped with Silver Halides

Kuznetsova Anastasiia[1,2], Ermakova L.E.[1], Girsova M.A.[2],
Kurylenko L.N.[2], Antropova T.V.[2]
a_kuznetsova95@mail.ru

[1]*Saint Petersburg State University, Saint Petersburg, Russia*
[2]*Grebenshchikov Institute of Silicate Chemistry, Russian Academy of Sciences, Saint Petersburg, Russia*

The development of modern technologies sets the task of developing practically significant high-performance materials with functional properties. One of the classes of such materials are light-sensitive silver-containing vitreous nanocomposites used for optical instrumentation. In this work, micro- (MIP, average pore radius is 1.5 nm, porosity is 25 %) and macroporous (MAP, average pore radius is 17 - 21 nm, porosity is 50 - 59 %) high-silica glasses were used as matrices, which were impregnated in two stages with $AgNO_3$ solutions, and then with KHal (Hal = Cl, Br, I) solutions [1]. It is known that the properties of nanostructured materials and their functional characteristics are primarily determined by the structural parameters and the state of their surface [2]. In connection with this, the work investigated the structure and electrokinetic potential of silicate porous glasses (MIP and MAP) and glasses modified with silver halides (MIP-AgCl, MAP-AgCl, MIP-AgBr, MAP-AgBr, MIP-AgI, MAP-AgI) in 0.01 M solutions of indifferent $NaNO_3$ electrolyte and $AgNO_3$ solutions containing potential-determining Ag^+ ions. The content of Ag_2O found by X-ray fluorescence analysis was (wt. %): MIP-AgCl 0.322, MAP-AgCl 1.122, MIP-AgBr 0.322, MAP-AgBr 1.992, MIP-AgI 0.239, MAP-AgI 0.801. The presence of phases of Ag_2O and AgHal was proved by X-ray phase analysis of silver-containing porous glasses. The electrokinetic potential (ζ) of porous glass particles was found by laser Doppler electrophoresis. It was found that the modification of porous silicate glass leads to an increase in the $|\zeta|$ values.

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