

Reinforced Silver-Embedded Silica Matrix from the Cheap Silica Source for the Controlled Release of Silver Ions

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In this study, a reinforced silver-embedded silica matrix was designed by utilizing the interaction between the $[AlO_4]^-$ tetrahedral and the Ag^+ in sol-gel process using sodium silicate as a silica precursor. The silver ions were embedded in silica matrix by the reduction of Ag^+ from various amounts of silver precursor. Aluminium ions were added to reinforce and improve the chemical durability of silver-embedded silica. A templated sample at Al/Ag = 1 atomic ratio was also synthesized to attempt a possibility of controlling porosity of the final product. Also, a sample neither embedded with silver nor templated was synthesized and characterized to serve as reference. The results demonstrate that materials with desirable properties can be obtained by this unprecedented method while utilizing sodium silicate, which is relatively cheap, as a silica precursor. This may significantly boost the industrial production of the silver-embedded silica for various applications.