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New organic-inorganic hybrid ureasil-based polymer and glass-polymer composites with ion-implanted silver nanoparticles

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Abstract

The micro-/nanoscopic structure of the hybrid organic-inorganic materials, based on polyether chains covalently linked to a silica framework through urea bridges, referred as ureasilicates or ureasils, and As₂S₃-ureasil composites with ion-implanted Ag nanoparticles is investigated. The formation of Ag nanoparticles is confirmed using optical transmission (surface plasmon resonance band of Ag nanoparticles) at ion-implantation doses of 2.5×10^{16} and 5.0×10^{16} ion/cm² on the example of ureasil. It is established with scanning electron microscopy that incorporation of the As₂S₃ clusters into ureasil assists to ion-synthesis of Ag nanoparticles in polymer matrix, more effectively at higher doses of ion-implantation and for silver containing (As₂S₃)₉₅Ag₅-ureasil composite. © 2012 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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Keywords

Glass-polymer composite, Hybrid organic-inorganic materials, Ion-implantation, Polymer ureasil, Silver nanoparticles