Scratch resistance enhancement of 3-glycidyloxypropyltrimethoxysilane coating incorporated with silver nanoparticles


Abstract

An effective method to enhance scratch resistance was developed using a 3-glycidyloxypropyltrimethoxysilane as a base on the formation of a transparent coating on glass substrate. The addition of silver nanoparticles improved further the scratch hardness of the thin film coating. The critical load obtained from the microscratch test increased from 233 to 3319 mN upon the addition of silver nanoparticles. The size of silver nanoparticles was analyzed using transmission electron microscope (TEM) and was found to be in the range of 12-48 nm. Addition of silver nanoparticles also increases the surface energy, hence the result enhances the hydrophilicity compared to substrate with only GLYMO coated on it. © 2014 Institute of Materials, Minerals and Mining

Keywords

Hydrophilicity; Nanosilver; Scratch resistance; Silane coupling agent; Surface morphology

References (31)


Innovative scratch proof nanocomposites for clear coatings

Effect of silver nano particles on the mechanical and physical properties of epoxy based silane coupling agent

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Abstract

In this work, silver nano particle was synthesized using the precipitation method at room temperature. The size of the silicate particles was analyzed using transmission electron microscope and found to be in the range of 20 to 40 nm. The multifunctional transparent film on glass substrate was prepared using silver nano particle solutions and 3-Glycidoxypropyltrimethoxysilane (GLYMO) by dip coating method. Ultraviolet-visible spectroscopy measurement shows low absorbance thus confirming high transparency level. The critical load obtained from the micro-scratch test showed an increase from 3000 mN to 3316 mN. © (2014) Trans Tech Publications.

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Adhesion, Coupling agent, Nano silver, Precipitation, Silane, Silver nitrate, Transparency

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