UNIVERSITI TEKNOLOGI MARA

CRYSTAL CLEAR THERMAL BARRIER COATING OF INORGANIC POLYSILOXANE RESIN FILLED WITH TITANIUM DIOXIDE FOR GLASS COATING APPLICATION

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ABSTRACT

This research develops transparent inorganic polysiloxane resin with TiO_2 to allow certain light wavelength to transmit through coated glass. Epoxy silane and amino silane hardener were synthesised in different molar ratios. Each was tested for their viscosity using Brookfield Viscometer. Different viscosities were observed before reaching constant values which designates complete formations of amide linkages. Highest viscosity of 30.5 mPa/s was recorded. FTIR supported the viscosity result by proving the presence of amide linkages. TiO_2 concentrations of 10%, 20% and 30% (w/v) in dehydrated ethanol were successfully dispersed using high-speed disperser. Dispersed TiO_2 were characterized for size distribution and recorded 87 nm with value of 1 PDI. UV absorber of 2-hydroxybenzophenone (HBP) with boron (BF_3) catalyst was formulated to aid in coating performance. The combined formulation of polysiloxane resin, HBP and BF_3 gives fastest curing time of 60 minutes and was chosen as an ideal coating binder. Surface tension test supported the curing results. Smart coating (SC) formulations consist of ideal coating binder and TiO_2 dispersion was coated on glass for pencil hardness analysis. 6H pencil grade was quoted as the hardest. SC's real-time measurement for UV, IR and daylight transmissions using WEP gives 0%, 10% and 61% of respectively.

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TABLE OF CONTENTS