

Melamine-based Hybrid Nano Materials Prepared by Sol-Gel Process

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Melamine resin has been widely used in the industrial coating fields due to its high surface hardness and abrasion resistance. In this study, using sol-gel process, the preparation of nano silica hybrid materials was attempted by employing the melamine resin system as the organic components to obtain the coating sols with enhanced abrasive resistance property. The thermal curing melamine resin system consists of hexamethylol melamine, hexamethoxymethylmelamine(HMMM) as a crosslinking agent, and acid catalyst. Phase compatibility between inorganic silicate network and organic melamine segments in the hybrid was evaluated by analyzing FT-IR spectra and investigating the glass transition behavior from DSC thermal analysis and optical transparency of the coated film. The stable and homogeneous microstructure of the melamine/SiO₂ hybrid gels with nano silica particles was observed due to strong phase connection resulting from the covalent bonding. It was revealed that there existed an optimum level of inorganic silica content(in this study 40-50 wt%) to produce high abrasive resistant melamine/SiO₂ hybrid coating materials.