

NANO COMPOSITE ADHESIVE FOR OPTICAL APPLICATIONS

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A novel UV curable composite adhesive material has been developed. It is based on a commercially available epoxy resin (Vitralit[®], Panacol GmbH). To improve general properties like shrinkage or strength surface modified nano sized SiO₂ particles (Aerosil[®], Degussa) were introduced as an inorganic filler. Since the particle size is in the nm range the transparency of the composite adhesive is not affected and therefore the composite is interesting for coupling technologies for optical or optoelectrical systems. Filler contents of up to 15 wt-% can be realized without viscosity increase.

Thermal analysis (DSC) and microhardness measurements of UV cured adhesive layers show that the SiO₂ filler improves the curing and shrinkage compared to the unfilled system without decreasing the adhesion to glass surfaces.

An alternative synthesis route has been developed using SiO₂ particles dispersed in an alcoholic solution. After removal of the solvent, SiO₂ contents of up to 20 wt-% are obtained in the composite adhesive without increasing its viscosity remarkably. The influence of this type of filling on the curing behaviour of the composite is investigated by DSC and microhardness measurements, the coefficient of the thermal expansion is measured by thermo mechanical analysis (TMA) and the Young's modulus and transformation temperature are determined by dynamic mechanical and thermal analysis (DMTA).

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