

TWIN POLYMERIZATION AS A MODULAR APPROACH FOR METAL-PLASTIC INTERFACE DESIGN

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Lightweight construction becomes more important in many fields of mechanical engineering due to weight reduction and energy efficiency. Furthermore, composites materials consisting of metal and plastics show great promise for advanced properties.

Twin polymerization is a new approach for the synthesis of suitable adhesion promoters. The principle of twin polymerization is based on specific twin monomers (TM), which contain two covalently bonded polymerizable monomeric fragments. In a mechanistically coupled process two polymers are formed in only one step.^[1,2] A nanostructured and interpenetrating network with domain sizes of 2–4 nm can be obtained thermally or catalyzed by acids or bases.^[3] If two TM are polymerized together the reaction is defined as “simultaneous twin polymerization (STP)”.^[2–4]

In recent works we developed adhesion promoters by a combination of twin- and epoxy monomer polymerization. We used the thermally induced STP for fabrication of metal-plastic-composites. STP takes place during the joining process, due to the applied heat and opens a wide field of applications e.g. hot pressing or injection molding for lightweight construction.^[5] The influence of the type and ratio of the used monomers and the mechanical properties were tested in respect to the adhesion between metallic and plastic materials.

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