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Effects of Interface-reactions in Compatibilized Rubber Powder-Polypropylene-TPEs

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The use of rubber powder as a dispersed elastomeric phase in a thermoplastic matrix offers an interesting opportunity for materials recycling of waste rubber. To achieve blend properties close to Thermoplastic Elastomers (TPE) a sufficient adhesion between the two blend components is a necessity. An only mechanical melt-mixing could not provide a suitable interface compatibilization and leads to a blend with poor mechanical properties. The application of a reactive melt-mixing process, using organic peroxides as radical donators, was found to be suitable to initiate a compatibilization reaction via interphase-grafting. Compatibilized Rubber Powder/PP – TPE produced by reactive melt-mixing in an internal mixer exhibit the mechanical properties of conventional two-phase dynamically vulcanized TPE-V. The Rubber Powder/PP-TPEs were characterized by means of mechanical testing, DSC-measurements, morphology characterization by “Stress-SEM” and investigation of the phase boundary by AFM. The results of the morphology investigations substantiate the occurrence of a compatibilization reaction between rubber particles and PP during reactive blending which is most likely responsible for the different mechanical material behavior of the compounds.