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NANOCOMPOSITES BASED ON TPU AND DIFFERENTLY MODIFIED EXPANDED GRAPHITES: ELECTRICAL AND MECHANICAL PROPERTIES AND MICROSTRUCTURES OBTAINED BY DIFFERENT PROCESSING CONDITIONS

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One main task of the research on nanocomposites is to obtain fine and homogeneous dispersion of the filler in the polymeric matrix to utilize their full potential as modifier already at low concentration. This is particularly important in the field of conductive composites, where usually high filler concentrations are required to obtain an opportune percolation. For elastomeric polymers, such as the thermoplastic polyurethanes (TPU) we used, high filler concentrations mean to lose the elastic properties of the matrix. Graphite (G) is very versatile filler with high conductivity. There are different methods to modify it chemically to oxidized graphite (GO) and to expand it to expanded graphite (EG). With the opportune choice of the processing conditions one can obtain suitable materials for electrical devices, biosensors and others. Different types of oxidized (GO), expanded (EG), and organo-modified (OMG) graphite were synthesised. The composites were prepared by melt compounding of the graphite with the thermoplastics, from solution by precipitating the polymers in presence of the dispersed EG, and by in-situ polymerization of polyurethane in presence of EG. Particular attention was paid to the possibility to bind the EG or the G with the TPU matrix covalently .We discuss the influence of the preparation and processing conditions on the resulting morphologies, the percolation concentrations, and conductivities in dependence on the structural and morphological parameters. Thermal and mechanical properties were determined. Acknowledgement: We are grateful to the Deutsche Forschungsgemeinschaft for supporting the project and to Georg H. LUH GmbH and SGL Carbon for providing the graphite specialities.