SURFACE ENERGY AND ISOELECTRIC POINTS OF EPOXY/ANHYDRIDE SURFACES: QUANTIFICATION OF THE CURING DEGREE

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Epoxy resins are widely used as adhesives, coatings and electrical insulation compounds. The properties of the polymer strongly depend on the curing degree, which can be controlled by the reaction conditions such as reaction time and temperature as well as the choice of the hardener and accelerator [1-2]. During the curing reaction, the anhydride and epoxy groups are ring-opened, forming polar carboxylic acids and alcohols groups, respectively (Figure 1). Upon further reaction, these functional groups are converted into ester groups. Hence, the surface polarity of the polymer decreases with increasing curing degree. In the present study, contact angle and streaming potential measurements were performed to investigate the relationship between the polarity of the polymer surface and the curing degree. It could be shown that both, the contact angles / surface energy as well as the isoelectric point correlated with the curing degree of the epoxy/anhydride resin.

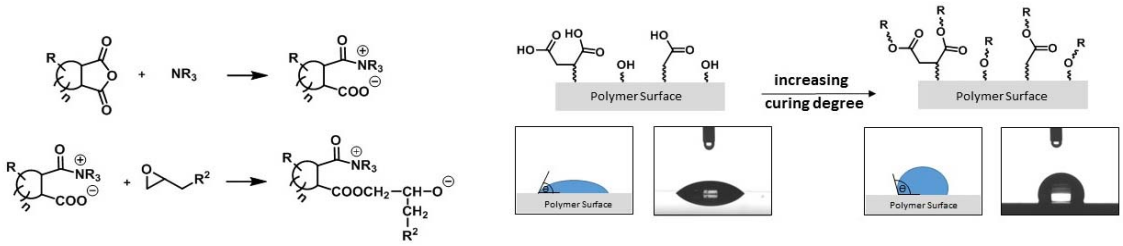

Figure 1: Left: Curing mechanism of an epoxy/anhydride system with an amine accelerator. Right: Influence of functional groups on the polymer surface on the contact angle measurements.

[1] C. Czaderski, E. Martinelli, J. Michels, M. Motavalli, *Composites Part B* **2012**, *43*, 389-410.

[2] R. Hardis, J. L. P. Jessop, F. E. Peters, M. R. Kessler, *Composites Part A* **2013**, *49*, 100-108.