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POLYMER AGEING IN ADHESIVE JOINTS AND LIFETIME PREDICTION

Prof. Dr. Wulff Possart, Chair for Adhesion and Interphases in Polymers

Saarland University, Campus Saarbrücken,

C6.3, D-66123 Saarbrücken, Germany

Ageing in polymers and in adhesive joints is crucial for any of their technical applications. Reactive adhesives build their polymer structure under the influence of the substrate in bonded metal joints. Hence interphases emerge in the bondline at the metal surface.

Epoxies are a most important class of polymers both as matrix resins for high performance polymer composites and for top structural adhesives. The talk reviews the physical and chemical ageing mechanisms established experimentally for epoxy networks in adhesive joints with metals. Consequences for the thermal glass transition as the major structural feature and for mechanical properties are presented. Effects of the interphase are elucidated as well. Finally, simulation results for the long-term ageing in a large bonded steel beam are presented as an illustration for the issue of life time assessment.