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ORIGINAL PAPER

# Thermal properties of epoxy–anhydride formulations cured using phosphonium accelerators

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**Abstract** Influence of structure of epoxy resin and anhydride hardener, as well as type and content of accelerator on thermal properties of epoxy–anhydride networks were investigated by dynamic mechanical analysis (DMA). The experimental values of molecular weight between crosslinks ($M_c$) in the epoxy polymers were determined. Influence of the catalyst on defect structure of the polymer network was observed. The use of two phosphonium salts as curing accelerators to a greater extent than 2-methylimidazole allows fabricating polymers with a higher crosslink density. The concentration dependence of polymer's thermal properties was studied and the optimum content of the accelerator giving the network with improved properties was determined.

## Introduction

Nowadays, composite materials are of key importance in the modern aviation and aerospace industries [1]. This is due to unmatched ratio of strength and weight properties of these materials. At the same time, the requirements for composites also become tougher. Typically, epoxy polymers are prepared by mixing resin and hardener (two-component compositions) before the direct use, or based on mixtures of resins and hardeners (one-component compositions) which have limited lifetime. In the latter case, the compositions include a catalyst to initiate curing under suitable conditions. The aircraft industry needs new formulations of one-component epoxy compositions suitable for use as coatings, adhesives, or long life binders for

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