

## Abstract

Effects of nanoclay content on morphology and spatial distribution of voids in resin transfer molded nanoclay/E-glass/epoxy composite disks are investigated. Closite®25A nanoclay loads of 2, 5, and 10wt% are mixed by sonication with a low-viscosity epoxy resin prior to filling the mold cavity containing 13.6% E-glass preform by volume. A disk without nanoclay is also molded. Once the molded composites are cured, voids on radial composite samples are evaluated via microscopic image analysis. The addition of nanoclay is found to result in a significant increase in the apparent viscosity of the clay-epoxy mixture, thus increasing the molding pressure. Void occurrence is observed to increase considerably with increasing nanoclay content, from 2.1% in the composite without nanoclay to 5.1 and 8.3% in the composites molded with 5 and 10wt% nanoclay, respectively. However, the composite with 2wt% nanoclay yields the lowest void content of 0.7%. Voids are observed to be, in average, smaller after the addition of nanoclay at all nanoclay concentrations. Presence of nanoclay in the impregnating resin induces at least 60% reduction in voids located inside fiber tows, which are trapped by the fluid front motion during impregnation. Irregularly shaped voids are also observed to decrease with increasing nanoclay content. A nonuniform void content and morphology is observed radially, which seems to be affected by the flow kinematics as well as possible breakdown and filtration of clay clusters.