

Properties of Epoxy Composite Reinforced with Amorphous and Crystalline Silica from Rice Husk

Authors : Norul Hisham Hamid, Amir Affan, Umami Hani Abdullah, Paridah Md. Tahir, Khairul Akmal Azhar, Rahmat Nawai, W. B. H. Wan Sulwani Izzati

Abstract : The dimensional stability and static bending properties of epoxy composite reinforced with amorphous and crystalline silica were investigated. The amorphous and crystalline silica was obtained by the precipitation method from carbonisation process of the rice husk at a temperature of 600 °C and 1000 °C for 7 hours respectively. The epoxy resin was mixed with 5%, 10% and 15% concentrations of amorphous and crystalline silica. The mixture was stirred for 10 minutes and cured at 28 °C for 72 hours and oven dried at 80 °C for 72 hours. The scanning electron microscope image showed the silica sized of 10-30nm was obtained. The water absorption and thickness swelling of epoxy/amorphous silica composite was not significantly different with silica concentration ranged from 0.08% to 0.09% and 0.17% to 0.20% respectively. The maximum modulus of rupture (85 MPa) and modulus of elasticity (3284 MPa) were achieved for 10% silica concentration. For epoxy/crystalline silica composite; the water absorption and thickness swelling were also not significantly different with silica concentration, ranged from 0.08% to 0.11% and 0.16% to 0.18% respectively. The maximum modulus of rupture (47.9 MPa) and modulus of elasticity (2760 MPa) were achieved for 10% silica concentration. Overall, the water absorption and thickness swelling were almost identical for epoxy composite made from either amorphous or crystalline silica. The epoxy composite made from amorphous silica was stronger than crystalline silica.

Keywords : epoxy, composite, dimensional stability, static bending, silica

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