Sifat tarik dan sifat tekuk komposit epoksi/e-glass/clay dengan variasi komposisi clay = Tensile properties and flexural properties of epoxy/ e glass/ clay composite with clay composition variation

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Abstrak

Bahan penyerap radar atau Radar Absorbent Material adalah salah satu material maju untuk keperluan teknologi siluman. Penambahan sejumlah kecil clay terhadap komposit Epoksi/E-Glass telah terbukti dapat membuat bahan penyerap gelombang elektromagnetik lebihbaik dibandingkan bahan komposit Epoksi/E-glass. Penelitian ini, yang merupakan kelanjutan dari penelitian sebelumnya mengenai penyerapan gelombang elektromagnetik, bertujuan mempelajari sifat tarik, sifat tekuk, dan permukaan patahan komposit Epoksi/E-glass/Clay.. Empat jenis sampel dibuat, yaitu, komposit Epoksi/E-Glass dan Epoksi/E-Glass/Clay dengan komposisi clay 1 wt%, 3 wt %, dan 5 wt %, yang difabrikasi dengan metode hand lay-up. Berdasarkan hasil uji tarik dan uji tekuk, nilai kuat tarik dan kuat tekuk tertinggi diperoleh pada komposit Epoksi/E-glass/Clay dengan fraksi beratclay 3 wt %, yang berturut-turut kenaikan kuat tarik dan kuat tekuknya sebesar 182,24% dan 23,5% terhadap komposit Epoksi/E-glass/Clay. Sedangkan nilai modulus tarik dan modulus tekuk pada komposit Epoksi/E-glass/Clay dengan fraksi berat clay 3 wt % memiliki nilai 11,5 GPa dan 6,04 GPa secara berturut-turut. Pengamatan permukaan patahan menggunakan Scanning Electrons Microscope menunjukkan jenis-jenis mode kegagalan yang terjadi adalah fiber pull-out, delaminasi, kegagalan matriks, fiber patah, dan keretakan mikro pada matriks. Selain itu, sisa matriks yang cukup banyak di fiber pada komposit Epoksi/E-glass/Clay dibanding komposit Epoksi/E-glass menunjukkan ikatan interfacial yang lebih baik saat sejumlah kecil clay ditambahkan.

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Radar Absorbent Materials are one of new advanced materials to be used in stealth technology. It was an evidence that the addition of a small amount of clay in Epoxy/E-glass composites provided a better electromagnetic wave absorber materials compared to Epoxy/E-glass composites. This research, which was a continuation of the previous research about electromagnetic wave absorption, aimed to study the tensile and flexural properties,as well as the modes failure of Epoxy/E-glass/Clay composites. Four different samples were made; they were Epoxy/E-Glass and Epoxy/E-Glass/Clay with 1 wt %, 3 wt %, and 5 wt % clay loadings. The samples were fabricated with a hand lay-up method. Tensile and flexural test results showed that the highest tensile and flexural strengths were obtained on the Epoxy/E-glass/Clay with 3 wt % clay?s weight fraction, which was increased up to 182,24 % and 23,5 % respectively from the tensile strength and flexural strength of Epoxy/E-glass composites. The tensile and flexural modulus values of Epoxy/E-glass/Clay composites with 3 wt % clay?s weight fraction were 11,3 GPa and 6,04 GPa respectively. An observation of fracture surface using Scanning Electrons Microscope showed that the failure modes that occurred on the fracture surfaces were fiber pull-out, delamination, matrix failure, fiber fracture, and matrix micro-cracks. Moreover, some amount of remaining matrix on the glass fiber at Epoxy/E-glass/Clay composites compared to Epoxy/E-glass composites showed that a better interfacial bond was obtained when a small addition of clay were added.