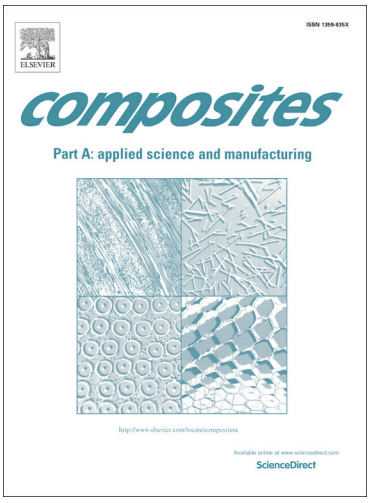

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A Sustainable Alternative to Current Epoxy Resin Matrices for Vacuum Infusion Molding

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Introduction

The need for polymer composites with low density and high strength is increasing across many industries such as aerospace, automotive and wind energy. In aerospace and automotive applications, the demand for lightweight materials is increasing since weight reduction equates to lower fuel consumption and CO_2 emissions [1][2]. In wind energy, polymer composites are the principle materials that enable production of longer and larger blades for transforming wind into electricity[3][4]. Wind energy is considered by many as a top candidate alternative energy source [5][6]. Thus, in the foreseeable future, demand for high performance polymer composites is expected to grow.

Thermoset resins or thermoset based nanocomposites are often used as matrix materials for the fabrication of high performance lightweight polymer composites [7][8] [9][10]. Such materials have a crosslinked three-dimensional network, which leads to strong mechanical properties and high glass transition temperatures (T_g)[11],[12]. Epoxy resins are the most prevalent of thermoset materials since, when properly designed, they can be processed at room temperature, provide good wettability to reinforcing fillers, high T_g, long lifetime and outstanding chemical resistance [13][14]. Epoxy resins are