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BOOK OF ABSTRACTS

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Mechanical properties and thermomechanical behaviour of poly (ethylene-co-vinyl acetate) based shape memory polymer composites

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ABSTRACT

Shape memory polymers (SMPs) are an emerging class of intelligent material that can program in to a temporary shape and recover to its original by exposing to a particular external stimulus. Poly (ethylene-co-vinyl acetate) (EVA) is one of the commercial polymers, which has been used to produce SMPs activated by heat. However, its low mechanical properties, low recovery stress and flexible behaviour restrict the potential applications under robust conditions. Herein, we developed a series of EVA based shape memory polymer composites (SMPCs) with glass fibre, carbon fibre and multi-walled carbon nanotube reinforcements. The effects of different reinforcements on tensile strength have been investigated. Moreover, the dynamic mechanical analysis has been carried out to characterize the glass transition temperature. The shape memory performance of the neat SMP and SMPCs were examined by measuring the angle recovery of 90° bended strips. Subsequently, the shape fixity and recovery ratios of the samples were calculated. This paper presents the manufacturing methods and performance of the fibre and particle reinforced EVA based SMPCs. The inclusion of reinforcements have enhanced the applicability of EVA based SMPCs in wider range of engineering application. In this paper the applicability of such SMPCs for machine elements are deliberated. Accordingly, a conceptual design of a SMPC made mechanical coupler is presented.

***Keywords*:** shape memory polymer composites; mechanical properties; thermomechanical behaviour; fibre reinforcement; multi-walled carbon nanotube.

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