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Upcycling of elastomeric waste residues into highly structured acoustic and heat insulating materials

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Abstract

In the developed economies, the automotive sector accounts for 10% of plastics converter demand and is the largest after Packaging (40%) and Building & Construction (20%). One objective of our research over the past ten years has been to develop technologies for the upcycling of automotive elastomeric waste residue for use as fire resistant noise and heat insulation materials in the construction industry. These elastomeric residues are the fibrous remnants resulting from the shredding of tyres, upholstery, bumper and carpet rubber. Here at the University of Bradford (UK), we, in collaboration with industrial partners, have developed new technologies to transform these waste residues into tailored porosity materials (open and closed cells of random or stratified sizes) suitable for long-life recyclable acoustic and heat insulation materials.

The processes we have developed to achieve these transformations have the uniqueness that they are cold operations (no heating of the residue particulates) but requiring appropriate mixing and binders. In the talk, we will describe the progress made and the fundamental underpinning of these structures and their acoustic and heat insulating performances, properties such as porosity, tortuosity, flow resistivity and thermal conductivity and performances such as sound absorption, impact sound and transmission loss measured using our state of the art experimental facilities. We will also present mathematical modelling that enables the prediction of the afore mentioned fundamental properties from the measured acoustic absorption. We will conclude the talk with reflections on how to link the tool-kit we have developed with waste processors/new materials developers so that these new materials can be integrated into market.

Biography:

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