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Influence of particle size of bio-calcium carbonate used as reinforcement of PBAT/PLA bio-based foams compatibilized with ionizing radiation

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Biio-filler from eggshells as reinforcement of bio-based polymers are based on their principle benefits such as good strength and stiffness besides being an environmental friendly, degradable and renewable material. Eggshell is an agricultural waste largely considered as garbage and discarded mostly because it contributes to pollution. Biodegradable polymers as PLA (poli-lactic acid) and PBAT (butylene adipate co-terephthalate) are thermoplastics which can be processed using most conventional polymer processing methods. PLA is high in strength and modulus (63 MPa and 3.4 GPa, respectively) but brittle (strain at break 3.8%) while PBAT is flexible and tough (strain at break ~710%). In order to reduce interfacial tension exhibited by PLA/PBAT blend, compatibilization is fundamental: herein it was used as compatibilizing agent PLA previously e-beam irradiated at 150 kGy: ionizing radiation induces compatibilization by free radicals, improving the dispersion and adhesion of blend phases, without the use of chemical additives and at room temperature. PLA/PBAT, 65/35 blend with bio-filler, from avian eggs, of 38 and 75 µm particle size were prior homogenized in a co-rotating twin-screw extruder and further foamed in a mono-screw extruder, by using CO₂ as Physical Blowing Agent (PBA). Characterizations involved: Melt Index, DSC, TGA, FTIR, SEM, XRD and mechanical essays.

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Biography

Graduated in Industrial Engineering by Pontificia Universidade Católica de S. Paulo (1969), graduated in Licensing in Sciences by Faculdade de Filosofia, Ciências e Letras de Santos (1972) – Member of Environmental Chemical Center (CQMA), in IPEN/SP (Nuclear Research Institute) since 1998, specifically in Polymers Laboratory – Master in 2009 with Development of Polymeric Foams from PP and HMSPP, Doctor in 2014 with thesis on Development of partially biodegradable foams from natural and synthetic polymers, pos-doctorate in Development of foams based in biodegradable polymers reinforced with micro-loads from renewable origin. Actually, pos-doctorate student in Development of foams based in biodegradable composites reinforced with micro and nano particles from bio-origin, compatibilized with electron beam.

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