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Valorization of feather wastes as useful and environmental friendly materials

Macanás J, Casadesús M, Colom X, Cañavate F J, Álvarez M D, Garrido N, Molins G and **Carrillo F**
Polytechnic University of Catalonia, Spain

Statement of the Problem: Poultry industry produces worldwide around 80,000,000 ton of chicken meat per year. Since feathers represent about 7-10% of the meat production, a huge amount of such waste is generated annually. Nowadays, the treatment of this left-over is associated to high environmental and economic impacts since chicken feathers are a truly waste that requires management and treatment (incineration, compost, etc.) which have a high cost compared with the near zero value of the feathers. For this reason, the proposal of commercial alternatives to valorize this waste is important to reduce the environmental impacts, increase the efficiency of using natural resources, and provide economic benefits. Our project has tackled different routes for reusing chicken feathers wastes with the aim of obtaining materials with industrial application and involving environmental benefits. The proposed solutions include the manufacture and characterization of two types of materials using or incorporating chicken feather waste in the process formulations for different final applications. Thermoplastic biocomposites including feathers could be used for manufacturing structural elements while non-woven materials could find an application niche either as bio-sorbent or as insulating barriers.

Methodology & Theoretical Orientation: Chicken feathers were stabilized by an oxidative cleaning with aqueous hydrogen peroxide and processed as filler in composite materials by using a Brabender mixer. Alternatively, the cleansed feathers were treated in a Shirley analyzer machine to remove the central quill and the resulting fibers were mixed with wool long fibers (50/50 %wt) in a card machine to obtain a non-woven material. Regarding the characterization of samples, on the one hand, tensile tests were carried out to determine mechanical properties of composites and, on the other hand, the biosorption of heavy metals and the acoustic absorption coefficient were determined.

Finding: It was possible to include up to 30% v/v of the residue in the composite and some formulations yield composites with enhanced properties. Moreover, the non-woven proved an efficient retention of metal ions such Cu^{2+}.

Conclusion & Significance: Research shows that the strategies used reduce the consumption of raw materials by incorporating the properly treated waste.

Biography

Macanás J is an Associate Professor in the Department of Chemical Engineering at Universitat Politècnica de Catalunya. His present research is mainly focused on Materials Science and Nanotechnology. He has developed some metal-polymer nanocomposites with different configurations for environmental and catalytic applications. He is currently working on the valorization of several industrial residues as materials with approaches such as the reported here.

jorge.macanas@upc.edu

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