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CIMBNC- Combination and interactions of three kinds of nanoclays structural modifiers, for the colored bio-nanocomposites optimization

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Biopolymers do not have competitive prices, which has prevented their industrial exploitation on a global scale so far. In this context, using nanoclays, improvements in certain biopolymer properties, mainly mechanical and thermal, have been achieved. However, research has been much less focused on changing optical properties through the incorporation of nanoclays. At the same time, current research has focused on obtaining nanopigments, by organic dyes adsorptions into different nanoclays in order to achieve sustainable colouring and high performance materials. By combining advances in these lines of research, biodegradable composites with optimal mechanical and optical properties can be obtained. The aim of this work is to find the optimal formulation of naturally sourced nanopigments, incorporate them into a biological origin epoxy resin, and obtain a significant improvement in their mechanical, and optical properties. We combine three structural modifiers in the nanopigment synthesis: surfactant, silane and mordant salt. The latter was selected in order to replicate the mordant textile dyeing with natural dyes. Using a Taguchi's desing L8, we look for the effect of the presence of the modifiers, the pH acidification, and the interactions effect between the synthesis factors. Three natural dyes were selected: chlorophyll, beta-carotene, and beetroot extract. Furthermore we use two kinds of laminar nanoclays, differentiated by the ion exchange charge: montmorillonite, and hydrotalcite. Then the thermal, mechanical and colorimetric characterization of the bionanocomposite materials was carried out. The optimal conditions to obtain the best bionanocomposite materials are using acid pH, and modifying the nanoclays with mordant and surfactant.

Biography

Micó-Vicent B has completed her PhD from Politecnic University of Valencia. She has been working as Statistical Professor in the Politecnic University of Valencia since 2012, and as Investigator Personal in the Colour and Vision Group in the synthesis of hybrid nanopigments. She has published two patents on the performance of optimal nanopigments.

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