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Maximum utilization of plant resources to produce edible nanocomposite bioplastics

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Environmentally friendly alternatives have been widely explored to replace petroleum-based, non-biodegradable materials for many applications, including food contact materials such as free-standing thin films for food packaging purposes. Edible films denote a major sustainable concept to produce food packaging with unique characteristics and functions. The research carried out at the LNNA of Embrapa in Brazil, together with national and international partners, has demonstrated the potential of plant materials as source of biopolymers, active ingredients, and reinforcement fillers for the production of multifunctional edible bioplastics. Numerous plant-derived polysaccharides (e.g., pectins, starches, and cellulose derivatives) and polypeptides (e.g., zein and soy protein) have been used as binding agents to improve the key properties of fruit and vegetable puree-based edible films featuring unique color and flavor, including but not being limited to those based on guava, papaya, banana, acerola, watermelon, and passion fruit. The mechanical, thermal and barrier performances – to mention a few – of the final materials can be further boosted by adding nanostructures extracted from plants too, such as cellulose nanofibers and nanowhiskers. We have also been incorporating essential oils isolated from plants to provide packaging with antimicrobial and antioxidant properties. The aim of this lecture is to provide the audience with an overview of the advances of our research towards the use of fruits and vegetables in an “as natural as possible” manner to produce nanocomposite bioplastics with a novel possibility of being eaten without any health concerns besides being biodegradable and featuring mechanical properties comparable to synthetic plastics.

Biography

Luiz H C Mattoso has completed his PhD in Materials Engineering in 1993 from Federal University of São Carlos (Brazil). He was a Visiting Scientist at Université Montpellier (France), Domaine Universitaire de Grenoble (France), and USDA (CA, USA). He was the Center Director of Embrapa Instrumentation, a Brazilian federal research organization, where he acts as a Senior Researcher. He has published more than 275 papers in reputed journals and 30 book chapters, edited 10 books, won over 25 awards and distinctions, filed 14 patents, served as Reviewer and as Editorial Board Member of several scientific journals.

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