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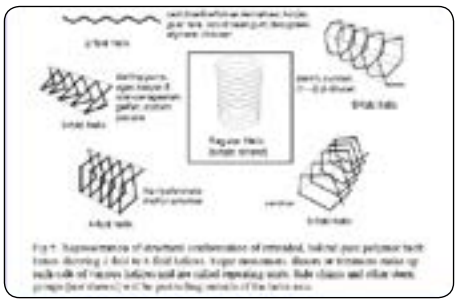
Gum Polysaccharides as Biopolymers – Structure, Properties and Applications

Gums polysaccharides are increasingly becoming relevant as biopolymer materials because they are food grade, safe, biodegradable and renewable. They are film formers and can be used for drug delivery without the toxicity concerns and more importantly as edible and biodegradable food packaging. Gum polysaccharides are structural materials found in nature and when isolated, dried into a powder and re-dissolved in water, they are widely shown to form ordered, helical conformations that vary based on the sugar residues making up the molecule and the glycosidic linkages joining the monomers together. Thickening of water, gelation and film formation are direct results of structures created when gum are dissolved in water, with or without heating. Cross-linking agents are not required to create these structures but these structures are easily manipulated or improved using food grade cross-linkers, salts, or plasticizers. If a gum solution is more viscous, this means that there is a better 3-D structures created as related to intermolecular hydrogen bonding between polymer chains. As in the case of gelling gums, aggregation of their polymer chains are so efficient that they can immobilize water completely to form a gel. The 3-D structures that form when gums dissolve in water are also responsible for the strength of the gum films formed after drying as shown in our work by linear and elongated gum structures such as konjac, galactomannans such as guar, tara and locust bean gum, cellulose derivatives such as CMC, MC and HPMC, agar and alginate. These gum films have different solubilities —cold water soluble to hot water soluble, which mimic the solubility of the parent gum. Edible and dissolvable packaging to replace paper and plastic for liquid sauces and flavors for dinner entrees, flavors mixes for various soups, high intensity sweeteners, pasta sauce, etc. are good applications for these gum films. These gum polymers can also encapsulate drugs, nutrients, probiotics, flavors and colors using various techniques such spray coating, bead encapsulation, coacervation, or can be a material for food casing, soft gel and empty capsules. This talk will also include actual demos of gum films.



Recent Publications:

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Biography

Dr. Marceliano Nieto received his doctorate in Food Science from the University of Georgia and a B.S. and M.S. degrees in Food Science from the University of the Philippines. He joined TIC Gums 26 years ago as Applications Manager, then Director of Technical Services for 15 years and currently as Senior Principal Scientist. He has developed key innovative products for the company and owns several innovation disclosures as potential IP for Ingredion. Dr. Nieto is Ingredion's inhouse gum guru with a broad amount of knowledge in gum chemistry and structures, functionality, rheology and gum applications. He has written 4 book chapters on gums and gums applications entitled 'Structure and Function of Gum Polysaccharide Based Edible Films and Coatings' and 'Stabilizing Bakery Fillings with Gums', "Gum Polysaccharides as Texturizing Systems" and "Edible Films and Packaging Using Gum Polysaccharides".

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