Nanoparticle protects oil in foods from oxidation, spoilage

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(PhysOrg.com) -- Using a nanoparticle from corn, a Purdue University scientist has found a way to lengthen the shelf life of many food products and sustain their health benefits.

Yuan Yao, an assistant professor of food science, has successfully modified the phytoglycogen nanoparticle, a starchlike substance that makes up nearly 30 percent of the dry mass of some sweet corn. The modification allows the nanoparticle to attach to oils and emulsify them while also acting as a barrier to oxidation, which causes food to become rancid. His findings were published in the early online version of the *Journal of Agricultural and Food Chemistry*.

Oxidation destabilizes oil droplets in emulsified food, degrading and changing the chemical structure of the oil and causing it to go bad. This oxidation happens in a wide range of products, shortening their shelf lives.

"This can be widely used in the food industry, cosmetics and nutritional supplements, any system in which the oxidation of lipids is a concern," Yao said. "The shelf life of a product can be low and the quality of the food can become bad because of the oxidation of the lipids."

In fish oils, for example, the lipid oxidation degrades Omega-3 fatty acids, which are essential in infant development and are thought to help with chronic inflammatory and heart diseases in adults.

Yao was able to modify the surface of phytoglycogen nanoparticle to make it behave like an emulsifier, creating phytoglycogen octenyl succinate, or PG-OS. PG-OS is thicker and denser than commonly used emulsifiers, creating a better defense from oxygen, free radical and metal ions, which cause lipid oxidation.

Yao's findings also showed that (symbol: epsilon), a food-grade polypeptide, can be added to the oil droplets to aid in the protection from oxidation. Polylysine is much smaller than the PG-OS nanoparticles, allowing it to fill in the gaps between PG-OS nanoparticles.

According to Yao's study, PG-OS nanoparticles with (symbol: epsilon) significantly increased the amount of time it took for oxidation to ruin the oil droplets, in some cases doubling the shelf life of the model product. Shelf life was tested by warming the emulsifiers and checking for chemical reactions that signal oxidation has occurred.

Source: Purdue University (news : web)