

# You butter believe it: Low-calorie spread made mostly of water

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Doctoral candidate Michelle Lee, foreground, and postdoctoral researcher Chen Tan work in the laboratory of Alireza Abbaspourrad to develop a buttery spread made mostly of water. Credit: Jason Koski, Cornell University

Cornell University food scientists have created a new low-calorie 'butter' spread that consists mostly of water. A tablespoon of this low-calorie spread has 2.8 grams of fat and 25.2 calories. Butter, on the other hand, which is 84% fat and about 16% water, has about 11 grams of fat and

nearly 100 calories.

They figured out a new process to emulsify a large amount of water with miniscule drops of vegetable oil and milk fat to mimic butter, at approximately one-fourth the calories of real butter and without artificial stabilizers.

"Imagine 80% water in 20% oil and we create something with the consistency of butter, with the mouth feel of butter and creaminess of butter," said food science professor and senior author Alireza Abbaspourrad.

Emulsifying water and oil is nothing new, said Abbaspourrad, but by using high-internal phase emulsions (HIPE), "we keep adding water to that oil until the final composition is 80% water and 20% oil."

The demand for low-fat, high-protein products has rapidly increased due to consumers' growing health awareness, said lead author Michelle C. Lee, a [doctoral candidate](#) in Abbaspourrad's research group.

"Since the HIPE technology features [high water](#)-to-oil ratios—while simultaneously delivering unique texture and functionality—it can play a role in providing healthier solutions for consumers," Lee said.



Using a special emulsion process, water is added to oil. When the water-to-oil ratio is 4 to 1, the oil spheres begin to deform and pack tightly against one another, resulting in a product that behaves like butter. Credit: Jason Koski, Cornell University

Abbaspourrad said food chemists can adjust for taste, preferences and health.

"We can add milk protein or plant-based protein, and since the [water](#) acts like a carrier, we can adjust for nutrition and load it with vitamins or add flavors," he said. "Essentially, we can create something that makes it feel like [butter](#)—and instead of seeing a lot of saturated fat, this has minute amounts. It's a completely different formulation."

**More information:** Michelle C. Lee et al, Ultrastable Water-in-Oil High Internal Phase Emulsions Featuring Interfacial and Biphasic

Network Stabilization, *ACS Applied Materials & Interfaces* (2019). [DOI: 10.1021/acsami.9b05089](https://doi.org/10.1021/acsami.9b05089)

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