# Method for Producing Amphiphilic and Amphoteric Soy Protein Colloids, Sub-Micron Fibers, and Microfibrils

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## ABSTRACT

Researchers at the University of California, Davis have developed a method for converting high molecular weight and complex globular proteins such as soy and pea into amphiphilic and amphoteric colloids, sub-microns fibers, and microfibrils important to multiple consumer and industrial applications.

## FULL DESCRIPTION

Soy proteins, a major (4 times in mass) by-product of soybean oil extraction, are highly desirable protein source for important food, environmental and other industry uses. The versatile properties of soy proteins – which include foaming, gelation, and film-forming – can be leveraged in adsorbent fibers and other uses ranging from flavor/drug encapsulation, metal/dye removal in wastewater to cosmetics. However, soy proteins do not disperse readily in water or most common organic solvents, and thus are difficult to be processed to realize the beneficial properties of these proteins to be leveraged in a wider array of applications across industries.

Researchers at the University of California, Davis have developed processes that can form soy proteins into colloids, gels, films, micofibrils or composite fibers. Stable aqueous soy protein colloids have been produced via either high-speed mechanical blending or sonication. The colloids can then be processed into emulsions or self-assembled or spun into ultra-fine fibers, fibrous structures or films. These colloids, sub-micron fibers, and microfibrils are uniquely amphiphilic and amphoteric and can serve multiple functions. For example, microfibrils exhibit liquid crystal behavior when shaken gently or stirred. These products can thus be used in multiple emulsifying, adhesion, adsorbing, encapsulating and controlled release applications – and as separating media for hydrophilic and hydrophobic or anionic and cationic compounds. The manufacturing techniques associated with these products are technically and economically viable at commercial scale - and thus are cost-effective options for producing sustainable and high performance materials critical to the food, chemical, environmental and multiple other industries.

## APPLICATIONS

- Uses as adsorbents, emulsifiers, detergents, dispersants and wetting and foaming agents across industry sectors – including in food formulation, cosmetics, biocomposites, porous membranes, and other consumer products and industrial materials

## FEATURES/BENEFITS

- Processing method is green (aqueous, no chemical additive), efficient and scalable
- Product properties include amphiphilic and amphoteric characteristics
- Soy protein colloids and microfibrils improve numerous properties of paper, coatings and cellulosic textiles

## PATENT STATUS

| Country | Type | Number | Dated | Case |
|---|---|---|---|---|
| United States Of America | Published Application | 20220378713 | 12/01/2022 | 2020-011 |

## ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Ultra Light Amphiphilic and Resilient Nanocellulose Aerogels and Foams
- Conductive and Elastic Nanocellulose Aerogels
- Nanocellulose-Assisted Exfoliation of Graphite to Few Layer Graphene
- Direct Production of Sulfated Cellulose Nanofibrils
- Coaxial Cellulose-Based Aerogel Fibers
- Compositions and Methods Related Functionalized Cellulose Nanofibrils

## INVENTORS

- Hsieh, You-Lo
- Liu, Xingchen

## OTHER INFORMATION

**KEYWORDS**

Soy Protein, Amphiphilic, Amphoteric, Colloid, Emulsions, Gels, Fibers, Microfibrils

**CATEGORIZED AS**

- **Materials & Chemicals**
  - Chemicals
  - Textiles
  - Thin Films
- **Engineering**
  - Other

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