Process For Recycling Surfactant In Nanoemulsion Production

Tech ID: 27484 / UC Case 2008-625-0

SUMMARY

UCLA researchers in the Department of Chemistry and Biochemistry have developed a novel method to separate and recycle surfactants used in the manufacturing of nanoemulsions.

BACKGROUND

Nanoemulsions are oil-in-water (or vice versa) suspensions of nanoscale droplets that range in size from 15 to 100 nm, and have applications in drug delivery, as well as in personal care and food products. Nanoemulsions have many advantages over traditional emulsion materials (e.g. liposomes, micelles, vesicles, and miniemulsions) including: longer shelf-life, low/no toxicity, improved bioavailability of drugs, and ability to solubilize lipophilic drugs. A major obstacle in nanoemulsion manufacturing is the use of large volumes of surfactants to generate nano-droplets, requiring the eventual removal and disposal of excess surfactant increasing production costs.

Current methods to remove surfactants from nanoemulsion mixtures are via ultracentrifugation or dialysis and can be costly and time-intensive. The development of a novel surfactant separation and recycling system would drive down manufacturing cost and times, allowing for the reuse of surfactants in generating the small nanoscale droplets necessary for nanoemulsions.

INNOVATION

Prof. Thomas Mason at UCLA has developed a novel surfactant separation and recycling system for nanoemulsion manufacturing. This system allows manufacturers to recover the excess surfactant needed to generate nanoemulsions and re-use it to continue to generate new nanoemulsions or smaller nanoscale droplets. Their system not only allows for the simple recovery of surfactants, but also droplet stabilizers, and surface active materials (e.g. proteins, lipids, and lipopeptides) which is desirable as these materials are exotic and may cost more than traditional surfactants. This innovation can make use of variety of recovery techniques that are cheaper and faster than traditional separation methods (e.g. ultracentrifugation and dialysis). This strategy to recycle surfactants and other key components of nanoemulsions will aid in generating low-cost highly stable nanoemulsions for use in drug delivery or manufacturing of food and personal care products.

APPLICATIONS

- Delivery of a wide variety of drugs or biologics for medical treatment
- Skin care products
- Safe and non-toxic emulsifier for food products

ADVANTAGES

- Innovation allows for recycling of surfactants, a key component in generating nanoemulsions
- Simultaneously recycles and removes surfactants from downstream nanoemulsion product
- Nanoemulsions have longer shelf-lives compared to other emulsions
- Generally non-toxic and makes use of Generally Recognized as Safe (GRAS) chemicals

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,890,585	02/06/2024	2019-954
United States Of America	Issued Patent	10,285,940	05/14/2019	2014-182
United States Of America	Issued Patent	9073022	07/07/2015	2008-625

CONTACT

UCLA Technology Development Group
ncd@tdg.ucla.edu
tel: 310.794.0558.

INVENTORS

- Mason, Thomas G.

OTHER INFORMATION

KEYWORDS

Nanoemulsion, emulsion, vesicle, micelle, liposome, miniemulsion, oil-in-water, water-in-oil, nanodroplets, drug delivery, drug delivery systems, nanoemulsion manufacturing, surfactants, surfactant recycling, lipophilic drugs, process recycling

CATEGORIZED AS

- **Biotechnology**
  - Food
  - Health
  - Other
- **Materials & Chemicals**
  - Nanomaterials
  - Other
- **Medical**
  - Delivery Systems
  - Other
- **Nanotechnology**
  - Materials
  - NanoBio
  - Other

RELATED CASES

2008-625-0, 2007-574-0, 2008-433-0, 2019-954-0, 2014-182-0, 2014-705-0

RELATED MATERIALS

- Nanoemulsions: Formation, Structure, and Physical Properties, T.G. Mason, J.N. Wilking, K. Meleson, C.B. Chang, and S.M. Graves, J. Phys.: Condens. Matter 18 R635-R666 (2006).

RELATED TECHNOLOGIES

- Ultrastable Nanoemulsions In Disordered And Ordered States
- Method of Making Multicomponent Nanoemulsions

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Measuring Size Distributions of Small-Scale Objects
- Method of Making Multicomponent Nanoemulsions
- Novel Multi-Scale Pre-Assembled Phases of Matter
- Ultrastable Nanoemulsions In Disordered And Ordered States
- Shape-Controlled Particles Having Subparticle Geometrical Features

UCLA Technology Development Group

10889 Wilshire Blvd., Suite 920,Los Angeles,CA 90095

https://tdg.ucla.edu

Tel: 310.794.0558 | Fax: 310.794.0638 | ncd@tdg.ucla.edu