Auburn University

Innovation Advancement & Commercialization

Precise, Rapid and Scalable Size Selection of Nanoparticle Populations

Contact

Brian Wright
Auburn University
Innovation Advancement
& Commercialization
334-844-4977
brian.wright@auburn.edu
https://iac.auburn.edu/
Reference: Size Selection

Inventors

Dr. Chris Roberts
Dean
Ginn College of Engineering

Dr. Chandler Mcleod
Ph.D. Graduate
Dept. of Chemical Engineering

Dr. Madhu Anand
Ph.D. Graduate
Dept. of Chemical Engineering

Steven R. Saunders
Ph.D. Graduate
Dept. of Chemical Engineering

Click here for a listing of Auburn patents available for immediate licensing

Click here for a listing of Auburn's available physical science technologies

Follow Auburn IAC

AUBURN UNIVERSITY

Overview

Auburn University seeks licensees for a method for the precise and rapid size selection of nanoparticles from a polydisperse population. When compared to existing processes, Auburn's CO_2-based process is faster, less expensive, cleaner, more precise, tunable and scalable. This technology has potential applications throughout the nanotechnology industry, including optics and medical imaging.

Advantages

- Significantly reduces time needed for a size fractionation compared to centrifugation
- Reduces expense and increases throughput (as compared to chromatographic methods)
- Narrow particle distributions as compared with existing methods
- Allows for mean particle size and polydispersity to be predetermined by simply choosing the proper CO_2 pressurization
- Reduces operating costs and environmental impact through use of CO_2 as the antisolvent
- Reduces post-processing time and costs through use of CO_2, allowing simple particle cleaning and solvent/antisolvent recycling
- Allows easy and precise separation of various nanostructures, including nanorods or quantum dots

Description

This method for precise, rapid and improved separation of nanoparticles by size relies on a solvent/antisolvent method that uses a gaseous antisolvent (e.g., CO_2) to create a tunable gas expanded liquid. Pressurized gaseous CO_2 is placed over a nanoparticle solution. By changing the pressure of CO_2, the resulting fraction of liquid CO_2 in the solution can be increased or decreased. Given that particle dispersibility is a function of CO_2 concentration in the liquid, particles of any given target size can be made to precipitate by simply manipulating the CO_2 pressure. Multiple monodisperse particle populations can be rapidly fractionated by adjusting only the CO_2 pressure and the liquid location, thereby eliminating the difficulties associated with other methods that are time and solvent intensive, expensive and/or have limited throughput.

Status

- This invention has been successfully verified by laboratory experiment with various ligand-coated metallic and semiconductor nanoparticles
- A scale prototype system has been created and tested (see figure)

Licensing Opportunities

- Two issued US Patents: 8,215,489 and 8,377,831
- Either or both of these patents are available for immediate non-exclusive licensing through Auburn's customizable "Ready to Sign" licensing program.
- Similar patents available for Nanoparticle Technologies, including a companion technology that uses a similar methodology to deposit nanoparticles as dense films with more uniformity, less processing and less cost than existing methods.