



US008753497B2

(12) **United States Patent**
Aubry et al.

(10) **Patent No.:** **US 8,753,497 B2**
(45) **Date of Patent:** **Jun. 17, 2014**

(54) **METHODS, APPARATUS AND SYSTEMS FOR CONCENTRATION, SEPARATION AND REMOVAL OF PARTICLES AT/FROM THE SURFACE OF DROPS**

(58) **Field of Classification Search**
USPC 204/450, 600, 601, 451, 563, 573;
210/643, 708
See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(22) Filed: **Dec. 14, 2012**

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(65) **Prior Publication Data**

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US 2013/0306479 A1 Nov. 21, 2013

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Related U.S. Application Data

(62) Division of application No. 12/710,885, filed on Feb. 23, 2010, now Pat. No. 8,357,279.

(60) Provisional application No. 61/208,319, filed on Feb. 23, 2009.

(51) **Int. Cl.**
B01D 17/06 (2006.01)
B03C 5/00 (2006.01)

(57) **ABSTRACT**

Methods are provided for concentrating particles on the surface of a drop or bubble in a continuous phase, for separating different types of particles, and for removing particles from the surface of the drop or bubble. The methods also facilitate separation of two types of particles on a drop or bubble, optionally followed by solidification of the drop and/or the continuous phase, for example to produce a particle for which the surface properties vary, such as a Janus particle. The methods can be also used to destabilize emulsions and foams by re-distributing or removing particles on the surface of the drop or bubble, facilitating coalescence of the particle-free drops or bubbles.

(52) **U.S. Cl.**
USPC **204/573; 204/450**

12 Claims, 23 Drawing Sheets

