



US009244065B1

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

(10) **Patent No.:** **US 9,244,065 B1**
(45) **Date of Patent:** **Jan. 26, 2016**

(54) **SYSTEMS, DEVICES, AND METHODS FOR AGGLOUTINATION ASSAYS USING SEDIMENTATION**

(75) Inventors: **Ulrich Y. Schaff**, Livermore, CA (US);
Gregory J. Sommer, Livermore, CA (US); **Anup K. Singh**, Danville, CA (US)

(73) Assignee: **Sandia Corporation**, Albuquerque, NM (US)

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

(21) Appl. No.: **13/423,073**

(22) Filed: **Mar. 16, 2012**

(51) **Int. Cl.**
G01N 33/543 (2006.01)
G01N 33/537 (2006.01)
B01D 21/26 (2006.01)
B01L 3/00 (2006.01)
G01N 33/538 (2006.01)

(52) **U.S. Cl.**
CPC **G01N 33/537** (2013.01); **B01D 21/262** (2013.01); **B01L 3/5021** (2013.01); **G01N 33/538** (2013.01); **G01N 33/543** (2013.01); **G01N 33/54313** (2013.01); **G01N 33/54366** (2013.01); **B01L 2400/0409** (2013.01); **B01L 2400/0457** (2013.01)

(58) **Field of Classification Search**
CPC G01N 33/543; G01N 33/54313; G01N 33/537; G01N 33/538; G01N 33/54366; B01D 21/26; B01D 21/262; B01D 21/00; B01D 43/00
USPC 436/824, 518, 536, 538, 523, 528; 435/287.2, 7.1, 287.1, 7.92, 7.94, 969

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,376,083 A	4/1968	Everhardus
3,555,284 A	1/1971	Anderson
3,744,974 A	7/1973	Maddox
3,844,341 A	10/1974	Bimshas et al.
4,125,375 A	11/1978	Hunter
4,156,570 A	5/1979	Wardlaw
4,164,690 A	8/1979	Muller et al.
4,282,464 A	8/1981	Uzuka
4,380,355 A	4/1983	Beardmore
4,554,071 A	11/1985	Ruijten et al.
4,656,143 A	4/1987	Baker et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN	101217859 A1	7/2008
JP	0407169887 A	7/1995

(Continued)

OTHER PUBLICATIONS

Abi-Samra, Kameel et al., "Infrared Controlled Waxes for Liquid Handling and Storage on a CD-Microfluidic Platform", The Royal Society of Chemistry; Lab Chip, 2011, 723-726.

(Continued)

Primary Examiner — Bao-Thuy Nguyen

Assistant Examiner — Erik B Crawford

(74) Attorney, Agent, or Firm — Dorsey & Whitney LLP

(57) **ABSTRACT**

Embodiments of the present invention include methods for conducting agglutination assays using sedimentation. Aggregates may be exposed to sedimentation forces and travel through a density medium to a detection area. Microfluidic devices, such as microfluidic disks, are described for conducting the agglutination assays, as are systems for conducting the assays.

14 Claims, 6 Drawing Sheets

