

6-24-2014

Dielectric Spectrometers with Planar Nanofluidic Channels

Pingshan Wang

Chunrong Song

Follow this and additional works at: https://tigerprints.clemson.edu/clemson_patents

Recommended Citation

Wang, Pingshan and Song, Chunrong, "Dielectric Spectrometers with Planar Nanofluidic Channels" (2014). *Clemson Patents*. 490.
https://tigerprints.clemson.edu/clemson_patents/490

This Patent is brought to you for free and open access by TigerPrints. It has been accepted for inclusion in Clemson Patents by an authorized administrator of TigerPrints. For more information, please contact kokeefe@clemson.edu.



US008758633B1

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

(10) **Patent No.:** **US 8,758,633 B1**
(45) **Date of Patent:** **Jun. 24, 2014**

(54) **DIELECTRIC SPECTROMETERS WITH PLANAR NANOFUIDIC CHANNELS**

(75) Inventors: **Pingshan Wang**, Central, SC (US);
Chunrong Song, Clemson, SC (US)

(73) Assignee: **Clemson University**, Clemson, SC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 927 days.

(21) Appl. No.: **12/838,687**

(22) Filed: **Jul. 19, 2010**

Related U.S. Application Data

(60) Provisional application No. 61/229,127, filed on Jul. 28, 2009.

(51) **Int. Cl.**
B44C 1/22 (2006.01)

(52) **U.S. Cl.**
USPC **216/2**; 216/83; 216/99; 977/888;
137/833

(58) **Field of Classification Search**
None
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,234,781	A	8/1993	Sakamoto et al.
5,489,233	A	2/1996	Cook et al.
5,533,923	A	7/1996	Shamouilian et al.
5,562,530	A	10/1996	Runnels et al.
6,126,532	A	10/2000	Sevilla et al.
6,559,039	B2	5/2003	Wang et al.
6,686,230	B2	2/2004	Meiling et al.
6,958,277	B2	10/2005	Pomarede et al.

7,459,914	B2	12/2008	Lindsey et al.
2007/0039920	A1	2/2007	Kutchoukov et al.
2007/0178655	A1	8/2007	Schmidt et al.
2008/0180188	A1	7/2008	Beerling et al.
2008/0242556	A1	10/2008	Cao et al.
2009/0042373	A1	2/2009	Zollner et al.
2009/0115094	A1	5/2009	Chou et al.
2009/0136948	A1	5/2009	Han et al.
2009/0155877	A1	6/2009	Iliescu et al.

OTHER PUBLICATIONS

J. Haneveld, "Nanochannel Fabrication and Characterization Using Bond Micromachining", Ph.D. Thesis, University of Twente, Enschede, The Netherlands, ISBN 90-365-2312-5, 2006.*

Abstract—Pingshan Wang, "Broadband dielectric spectrometers with 1-10 nm planar nanofluidic channels", National Science Foundation, Jun. 30, 2009.

* cited by examiner

Primary Examiner — Lan Vinh

Assistant Examiner — Jiong-Ping Lu

(74) *Attorney, Agent, or Firm* — Dority & Manning, PA

(57) **ABSTRACT**

Disclosed is a method for fabricating nanofluidic channels having a height of from about 1 nm to about 10 nm. Generally, the method includes formation of doped silicon parallel strips in a silicon substrate, formation of a native oxide layer on the substrate, and etching of the native oxide layer at one of the strips to form a channel of a depth of between about 1 nm and about 10 nm. The method also includes bonding a second wafer to the surface, the second wafer including through etched windows to provide probe contacts to two of the parallel strips during use. These parallel strips provide high-frequency transmission lines in the device that can provide broadband dielectric spectroscopy measurement within the nanochannels.

7 Claims, 11 Drawing Sheets

