



US007169358B2

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

(10) **Patent No.:** **US 7,169,358 B2**
(45) **Date of Patent:** **Jan. 30, 2007**

(54) **ELECTROCHEMICAL DETECTION OF NUCLEIC ACID SEQUENCES**

(76) Inventors: **Robert W. Henkens**, 169 N. Shore Dr., Beaufort, NC (US) 28516; **John P. O'Daly**, 112 Jasmine Ct., Carrbor, NC (US) 27510; **Marek Wojciechowski**, 102 Otterbein Ct., Cary, NC (US) 27513; **Honghua Zhang**, 12865 Caminito Diego, San Diego, CA (US) 92130; **Najih Naser**, 4123 Pescadero Ct., Orlando, FL (US) 32817; **R. Michael Roe**, 104 Bromfield Way, Apex, NC (US) 27502; **Thomas N. Stewart**, 4802 Glendarion Dr., Durham, NC (US) 27713; **Deborah M. Thompson**, 5909 Baird Dr., Raleigh, NC (US) 27606-9445; **Rebecca Sundseth**, 114 Settlers Mill La., Durham, NC (US) 27713; **Steven E. Wegner**, 204 Donegal Dr., Chapel Hill, NC (US) 27514

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 312 days.

(21) Appl. No.: **10/082,714**

(22) Filed: **Feb. 25, 2002**

(65) **Prior Publication Data**
US 2004/0072158 A1 Apr. 15, 2004

Related U.S. Application Data
(60) Division of application No. 09/549,853, filed on Apr. 14, 2000, now Pat. No. 6,391,558, which is a continuation-in-part of application No. 09/044,206, filed on Mar. 17, 1998, now abandoned.
(60) Provisional application No. 60/040,949, filed on Mar. 18, 1997.

(51) **Int. Cl.**
G01N 15/06 (2006.01)
G01N 21/76 (2006.01)
G01N 21/00 (2006.01)
B32B 5/02 (2006.01)
C07H 21/00 (2006.01)
C12Q 1/68 (2006.01)

(52) **U.S. Cl.** **422/68.1**; 435/6; 422/52; 422/55; 422/82.1; 422/61; 536/23.1

(58) **Field of Classification Search** 435/6; 422/52, 55, 61, 68.1, 82.1, 53; 536/23.1
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,518,901 A * 5/1996 Murtagh 435/91.2
6,063,259 A * 5/2000 Wang et al. 205/777.5
2002/0177135 A1 * 11/2002 Doung et al. 435/6
2004/0086423 A1 * 5/2004 Wohlstadter et al. 422/52

FOREIGN PATENT DOCUMENTS

EP 0407291 A1 * 1/1991

OTHER PUBLICATIONS

Stratagene catalog 1988, p. 39.*

* cited by examiner

Primary Examiner—Jezia Riley
(74) *Attorney, Agent, or Firm*—Akerman Senterfitt; Nicholas A. Zachariades

(57) **ABSTRACT**

An electrochemical detection system which specifically detects selected nucleic acid segments is described. The system utilizes biological probes such as nucleic acid or peptide nucleic acid probes which are complementary to and specifically hybridize with selected nucleic acid segments in order to generate a measurable current when an amperometric potential is applied. The electrochemical signal can be quantified.

14 Claims, 20 Drawing Sheets

