

(12) **United States Patent**
Bar-Or et al.

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(54) **METHODS AND SYSTEMS FOR MEASURING AND USING THE OXIDATION-REDUCTION POTENTIAL OF A BIOLOGICAL SAMPLE**

C12Q 1/00; C12Q 1/02; C12Q 1/34; C12Q 1/54; G01R 17/02; H01J 49/0036
See application file for complete search history.

(71) Applicant: **Aytu BioScience, Inc.**, Englewood, CO (US)

(56) **References Cited**

U.S. PATENT DOCUMENTS

(72) Inventors: **Raphael Bar-Or**, Denver, CO (US);
David Bar-Or, Englewood, CO (US);
Leonard T. Rael, Centennial, CO (US)

3,956,094 A 5/1976 Capuano
4,053,381 A 10/1977 Hamblen et al.

(Continued)

(73) Assignee: **AYTU BIOSCIENCE, INC.**, Englewood, CO (US)

FOREIGN PATENT DOCUMENTS

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CN 1301343 6/2001
CN 1776414 5/2006

(Continued)

OTHER PUBLICATIONS

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International Search Report and Written Opinion for International Patent Application No. PCT/US13/66432, mailed May 13, 2014, 16 pages.

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Primary Examiner — Jennifer Dieterle

(74) *Attorney, Agent, or Firm* — Sheridan Ross P.C.

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(57) **ABSTRACT**

Methods and systems for measuring and using the oxidation-reduction characteristics of a biological sample are provided. The system generally includes a test strip and a readout device. A fluid sample is placed in the test strip, and the test strip is in turn operatively connected to the readout device. The readout device provides a controlled current that is sent across the fluid in the sample chamber. In addition, the readout device identifies an inflection point or transition time at which the voltage between contacts of the test strip is changing at the highest rate. The oxidation-reduction capacity of the sample is taken as the integral of the current profile from the time at which current begins to be supplied to the sample to the identified transition time.

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(58) **Field of Classification Search**
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