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- (54) **METHOD AND SYSTEM FOR MULTIPLEX GENETIC ANALYSIS**
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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 1380 days.

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Defintion of "total internal reflection" provided by the online dictionary at techweb.net.*

(65) **Prior Publication Data**

(Continued)

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(57) **ABSTRACT**

- (51) **Int. Cl.**
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- (52) **U.S. Cl.**
CPC **G01N 21/648** (2013.01); **C12Q 1/6869** (2013.01); **G01N 21/6452** (2013.01)

The present disclosure provides apparatus, systems and method for detecting separately and substantially simultaneously light emissions from a plurality of localized light-emitting analytes. A system according to exemplary embodiments of the present disclosure comprises a sample holder having structures formed thereon for spatially separating and constraining a plurality of light-emitting analytes each having a single nucleic acid molecule or a single nucleic acid polymerizing enzyme, a light source configured to illuminate the sample holder, an optical assembly configured to collect and detect separately and substantially simultaneously light emissions associated with the plurality of light emitting analytes. The system may further include a computer system configured to analyze the light emissions to determine the structures or properties of a target nucleic acid molecule associated with each analyte.

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

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29 Claims, 27 Drawing Sheets

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