

(12) **United States Patent**  
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(10) **Patent No.:** **US 9,410,846 B2**  
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **MULTI-CHANNEL UP-CONVERSION INFRARED SPECTROMETER AND METHOD OF DETECTING A SPECTRAL DISTRIBUTION OF LIGHT**

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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 0 days.

(21) Appl. No.: **14/900,329**

(22) PCT Filed: **Jul. 9, 2014**

(86) PCT No.: **PCT/DK2014/050215**

§ 371 (c)(1),  
(2) Date: **Dec. 21, 2015**

(87) PCT Pub. No.: **WO2015/003721**

PCT Pub. Date: **Jan. 15, 2015**

(65) **Prior Publication Data**

US 2016/0153834 A1 Jun. 2, 2016

(30) **Foreign Application Priority Data**

Jul. 9, 2013 (EP) ..... 13175711

(51) **Int. Cl.**  
**G01J 3/02** (2006.01)  
**G01J 3/28** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **G01J 3/0297** (2013.01); **G01J 3/0294** (2013.01); **G01J 3/2803** (2013.01); **G01J 3/2823** (2013.01)

(58) **Field of Classification Search**  
CPC ..... G01J 3/02  
See application file for complete search history.

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(57) **ABSTRACT**

A multi-channel infrared spectrometer for detecting an infrared spectrum of light received from an object. The spectrometer comprises a wavelength converter system comprising a nonlinear material and having an input side and an output side. The wavelength converter system comprises at least a first up-conversion channel and a second up-conversion channel, and is arranged such that light traversing the wavelength converter system at different angles in the nonlinear material is imaged into different positions in an image plane. The first up-conversion channel is configurable for phase-matching infrared light in a first input wavelength range incident on the first side and light in a first output wavelength range output on the second side, and correspondingly, the second up-conversion channel is configurable for phase-matching infrared light in a second input wavelength range incident on the first side into light in a second output wavelength range output on the second side. The spectrometer further comprises a demultiplexer configured for demultiplexing light in the first up-conversion channel and light in the second up-conversion channel. The demultiplexer is located on the first side or the second side of the wavelength converter system. Finally, the spectrometer comprises a spatially resolved detector arranged in the image plane to detect light in the first output wavelength range and second output wavelength range output of the wavelength converter system.

**14 Claims, 4 Drawing Sheets**

