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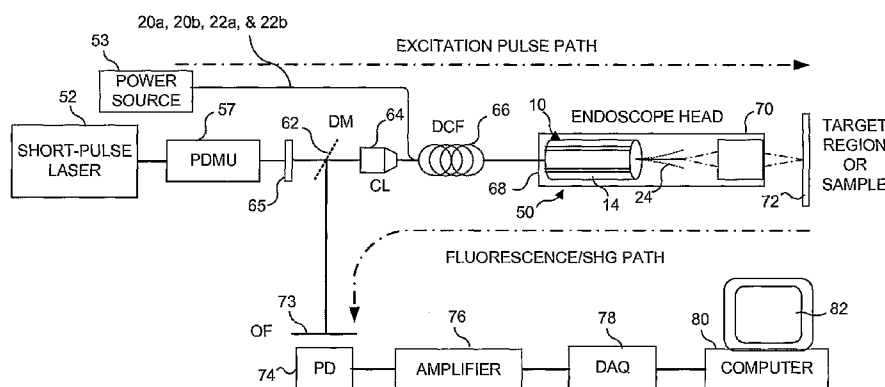
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(54) Title: **SCANNING FIBER-OPTIC NONLINEAR OPTICAL IMAGING AND SPECTROSCOPY ENDOSCOPE**



(57) Abstract: A miniature, flexible, fiber-optic scanning endoscope for nonlinear optical imaging and spectroscopy. The endoscope uses a tubular piezoelectric actuator for activating a cantilevered optical fiber from which pulsed light produced by a laser source exits and is directed to a target region through a micro-lens. The actuator is activated by two modulated signals that achieve two-dimensional beam scanning in a desired scan pattern. A double-clad optical fiber is employed for delivery of the excitation pulsed light and collection of emitted light received from the target region. The pulsed light travels through a core of the double-clad optical fiber, and the emitted light from the target region is directed into the core and inner cladding of the optical fiber and conveyed to a proximal end, for detection and processing. The emitted light can include multiphoton fluorescence, second harmonic generation light, and spectroscopic information, for imaging.

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INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - A61B 6/00

USPC - 600/478

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 600/300, 407, 476

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

PubWEST, Google Patents, Google Scholar

Spectrometry, spectrometer, spectroscopy, optical, fiber, scan, scanner, scanning, scanned, fluorescence, cantilever, pulse, pulsed, pulsing, emitted, tissue, multiphoton, multi-photon, dispersion, harmonic, stretcher, piezoelectric

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6975898 B2 (SEIBEL) 13 December 2005 (13.12.2005), entire document	1-6, 9-12, 16, 17, 19-27, 29-33
Y		7, 8, 13-15, 18, 28, 34, 35
Y	US 6839586 B2 (WEBB) 4 January 2005 (04.01.2005), col 10 ln 17-24 and claims 4 and 7	7, 8, 18, 34, 35
Y	US 4928316 A (HERITAGE et al.) 22 May 1990 (22.05.1990), claim 14	13-15, 28
Y	US 6826342 B1 (BISE et al.) 30 November 2004 (30.11.2004), claim 1	15

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