US007292031B2

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

(10) **Patent No.: US 7,292,031 B2**
(45) **Date of Patent: Nov. 6, 2007**

(54) **MICRO-CELL FOR NMR GYROSCOPE**

(75) Inventors: **Henry C. Abbink**, Westlake Village, CA (US); **Edward Kanegsberg**, Pacific Palisades, CA (US); **Kenneth D. Marino**, Oak Park, CA (US); **Charles H. Volk**, Newbury Park, CA (US)

(73) Assignee: **Northrop Grumman Corporatin**, Los Angeles, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 105 days.

(21) Appl. No.: **11/312,310**

(22) Filed: **Dec. 20, 2005**

(65) **Prior Publication Data**

US 2006/0132130 A1 Jun. 22, 2006

(51) **Int. Cl.**
G01V 3/00 (2006.01)

(52) **U.S. Cl.** **324/304**; 324/305

(58) **Field of Classification Search** 324/304, 324/305

See application file for complete search history.

(56) **References Cited**

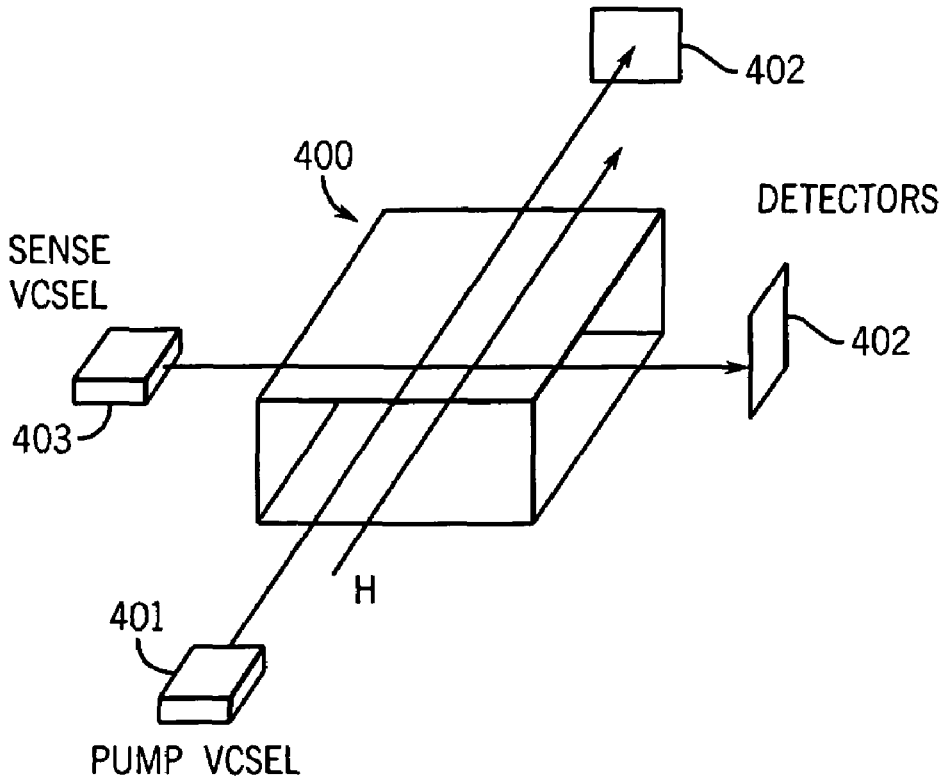
U.S. PATENT DOCUMENTS

3,577,069	A	5/1971	Malnar et al.	
4,450,407	A	5/1984	Kwon et al.	
4,461,996	A *	7/1984	Kwon	324/315
4,596,962	A	6/1986	Robinson	
6,261,320	B1 *	7/2001	Tam et al.	623/1.15

* cited by examiner

Primary Examiner—Louis M. Arana
(74) *Attorney, Agent, or Firm*—Carmen B. Patti & Assoc., LLC

(57) **ABSTRACT**

A cell in one example comprises an alkali metal and a coating of parylene on an interior surface of the cell. In one implementation, the alkali metal may be an optically pumped gaseous phase of an alkali metal. The parylene coating minimizes interaction of the excited state of the alkali metal, increases lifetime of the excited state, and minimizes interaction of nuclear spin states with the cell walls.

40 Claims, 4 Drawing Sheets