US007250723B1

(12) **United States Patent**
**Foster**

(10) **Patent No.: US 7,250,723 B1**
(45) **Date of Patent: Jul. 31, 2007**

(54) **CATHODE LUMINESCENCE LIGHT SOURCE FOR BROADBAND APPLICATIONS IN THE VISIBLE SPECTRUM**

(75) Inventor: **John E. Foster**, Strongsville, OH (US)

(73) Assignee: **The United States of America as represented by the Administrator of NASA**, Washington, DC (US)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 392 days.

(21) Appl. No.: **11/016,735**

(22) Filed: **Dec. 21, 2004**

(51) **Int. Cl.**
***H01J 17/49*** (2006.01)

(52) **U.S. Cl.** ..... **313/582**

(58) **Field of Classification Search** ..... 313/581, 313/582, 586, 231.31, 484, 491
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

| | | | | |
|---|---|---|---|---|
| 3,612,686 | A | 10/1971 | Braman et al. | |
| 3,710,125 | A | 1/1973 | Jacobs et al. | |
| 3,848,248 | A * | 11/1974 | MacIntyre, Jr. | 345/60 |
| 3,860,846 | A * | 1/1975 | Mayer | 313/491 |
| 3,911,315 | A | 10/1975 | Todd, Jr. et al. | |
| 4,295,989 | A | 10/1981 | Klein et al. | |
| 4,513,025 | A | 4/1985 | Clark et al. | |
| 4,814,105 | A | 3/1989 | Oversluizen et al. | |
| 4,851,735 | A | 7/1989 | Gosslar et al. | |
| 5,155,668 | A | 10/1992 | Tanner et al. | |
| 5,453,305 | A | 9/1995 | Lee | |
| 6,136,226 | A | 10/2000 | Sakai | |
| 6,693,377 | B1 | 2/2004 | Mueller et al. | |
| 2003/0183807 | A1 | 10/2003 | Shankar et al. | |

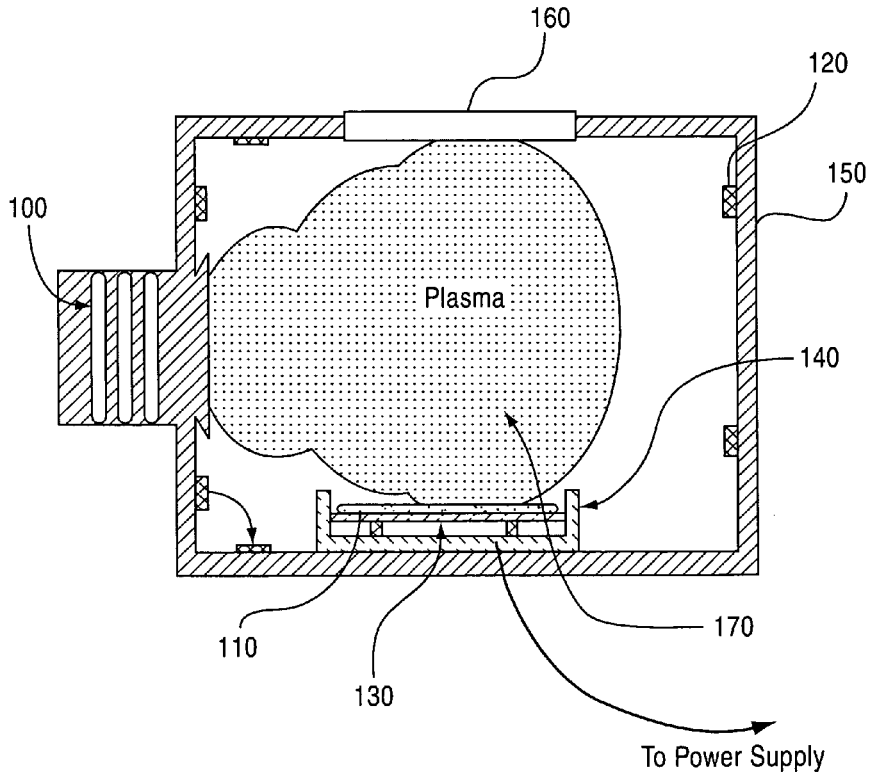
FOREIGN PATENT DOCUMENTS

| | | |
|---|---|---|
| JP | 60220544 A | 11/1985 |
| JP | 63266729 A | 11/1988 |
| WO | 94/00867 | 1/1994 |

* cited by examiner

*Primary Examiner*—Vip Patel
(74) *Attorney, Agent, or Firm*—Arlene P. Neal; Kent N. Stone

(57) **ABSTRACT**

A device and method for generating cathode luminescence is provided. The device and method generate broad spectrum electromagnetic radiation in the visible. A layer of particles, such as quartz or alumina powder, is exposed to electrons in a plasma discharge. Surface excitation of these particles or the generations/excitation of F-center sites give rise to luminescence.

**26 Claims, 10 Drawing Sheets**