



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

(10) **Patent No.:** **US 7,808,770 B2**
(45) **Date of Patent:** **Oct. 5, 2010**

(54) **MONOLITHIC CERAMIC CAPACITOR**

6,388,864 B1 * 5/2002 Nakagawa et al. 361/309
6,771,485 B2 * 8/2004 Yokoyama et al. 361/309
6,773,827 B2 * 8/2004 Higuchi 428/646

(75) Inventors: **Hiroto Itamura**, Echizen (JP); **Masaaki Taniguchi**, Nyuu-gun (JP); **Yoshio Kawaguchi**, Fukui (JP)

(73) Assignee: **Murata Manufacturing Co., Ltd.**, Kyoto (JP)

(Continued)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 338 days.

FOREIGN PATENT DOCUMENTS

JP 2-116720 U 9/1990

(21) Appl. No.: **12/140,341**

(Continued)

(22) Filed: **Jun. 17, 2008**

OTHER PUBLICATIONS

(65) **Prior Publication Data**

US 2009/0002920 A1 Jan. 1, 2009

Partial English translation of JP 2-116720, published on Sep. 19, 1990; Kind Code: U.

(30) **Foreign Application Priority Data**

(Continued)

Jun. 27, 2007 (JP) 2007-169175
Mar. 28, 2008 (JP) 2008-085617

Primary Examiner—Eric Thomas
(74) *Attorney, Agent, or Firm*—Keating & Bennett, LLP

(51) **Int. Cl.**

H01G 4/228 (2006.01)
H01G 4/005 (2006.01)

(57) **ABSTRACT**

(52) **U.S. Cl.** 361/309; 361/306.3; 361/303

(58) **Field of Classification Search** ... 361/306.1–306.3, 361/311, 303
See application file for complete search history.

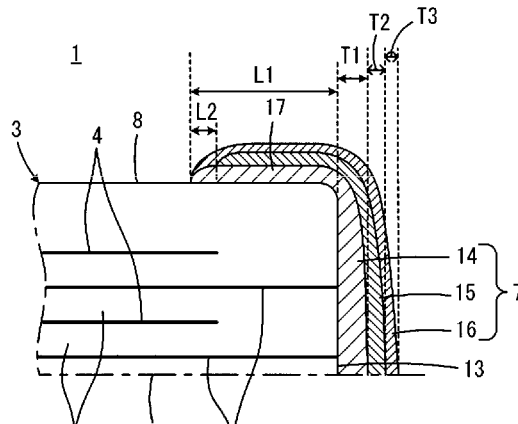
In an LW-reverse-type monolithic ceramic capacitor including external terminal electrodes each including a resistance component, internal electrodes include nickel or a nickel alloy, and the external terminal electrodes each include a first layer, a second layer provided on the first layer, and a third layer provided on the second layer. The first layer has a wrap-around portion extending from an end surface to principal surfaces and side surfaces of a capacitor main body, and contains a glass component and a compound oxide that reacts with Ni or the Ni alloy. The second layer covers the first layer such that the edge of the wrap-around portion of the first layer remains exposed, and contains a metal. The third layer covers the edge of the wrap-around portion of the first layer and the second layer, and is formed by plating.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,604,676 A 8/1986 Senda et al.
5,107,394 A * 4/1992 Naito et al. 361/309
5,426,560 A * 6/1995 Amaya et al. 361/309
5,712,758 A * 1/1998 Amano et al. 361/321.2
5,805,409 A * 9/1998 Takahara et al. 361/303
6,259,593 B1 * 7/2001 Moriwaki et al. 361/303
6,310,757 B1 * 10/2001 Tuzuki et al. 361/308.1
6,344,963 B1 * 2/2002 Mori 361/306.3
6,381,118 B1 * 4/2002 Yokoyama et al. 361/308.1

8 Claims, 4 Drawing Sheets



US 7,808,770 B2

Page 2

U.S. PATENT DOCUMENTS

7,054,136 B2 5/2006 Ritter et al.
7,304,831 B2* 12/2007 Yoshii et al. 361/321.2
7,436,649 B2* 10/2008 Omura 361/306.3
2006/0234022 A1* 10/2006 Liu et al. 428/210
2007/0128794 A1 6/2007 Kusano et al.
2007/0242416 A1* 10/2007 Saito et al. 361/321.1

FOREIGN PATENT DOCUMENTS

JP 06096986 A * 4/1994

JP 08-097072 A 4/1996
JP 09-148174 A 6/1997
JP 2000-357627 A 12/2000
JP 2002-217054 A 8/2002
WO 2006/022258 A1 3/2006

OTHER PUBLICATIONS

Official Communication issued in corresponding Japanese Patent Application No. 2008-085617, mailed on Oct. 6, 2009.

* cited by examiner

FIG. 1

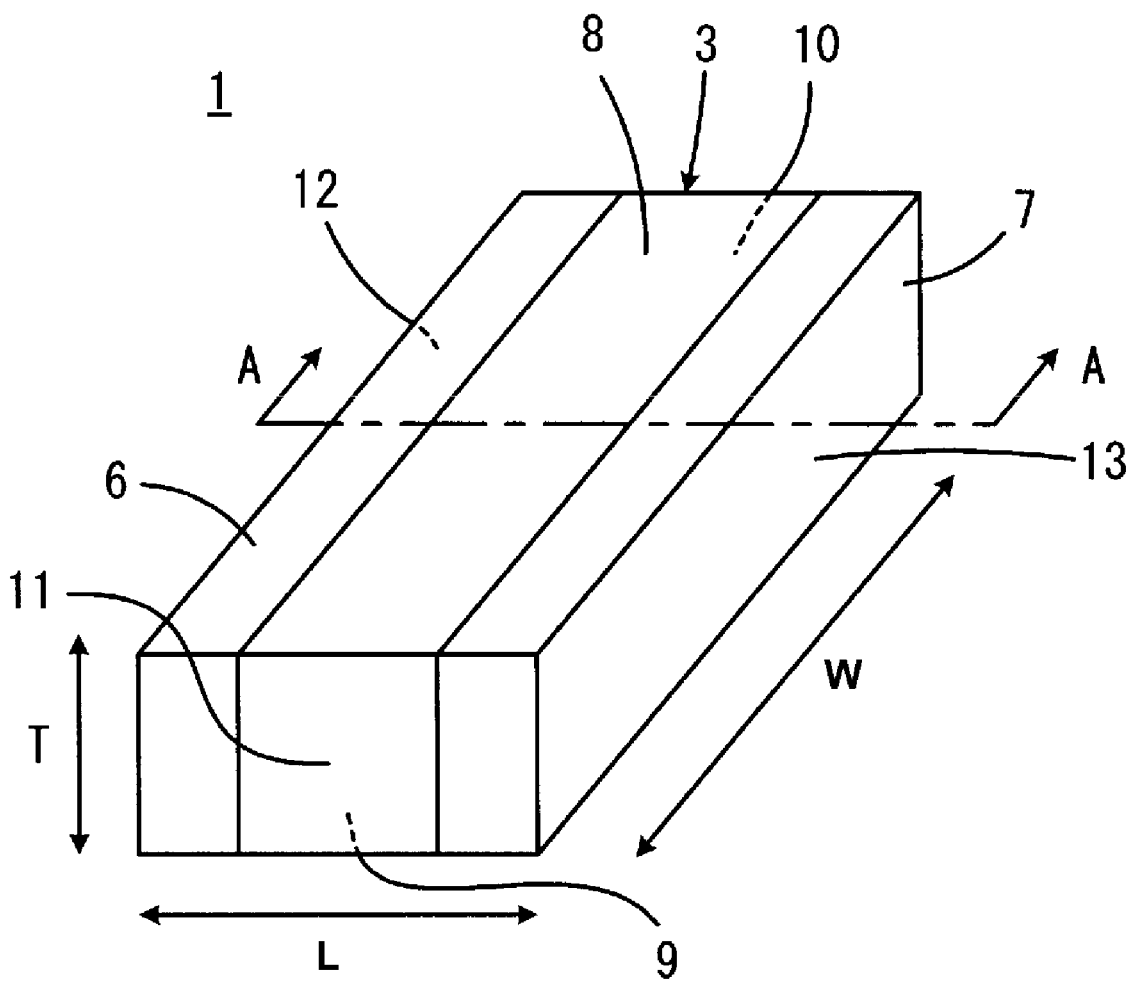


FIG. 3A

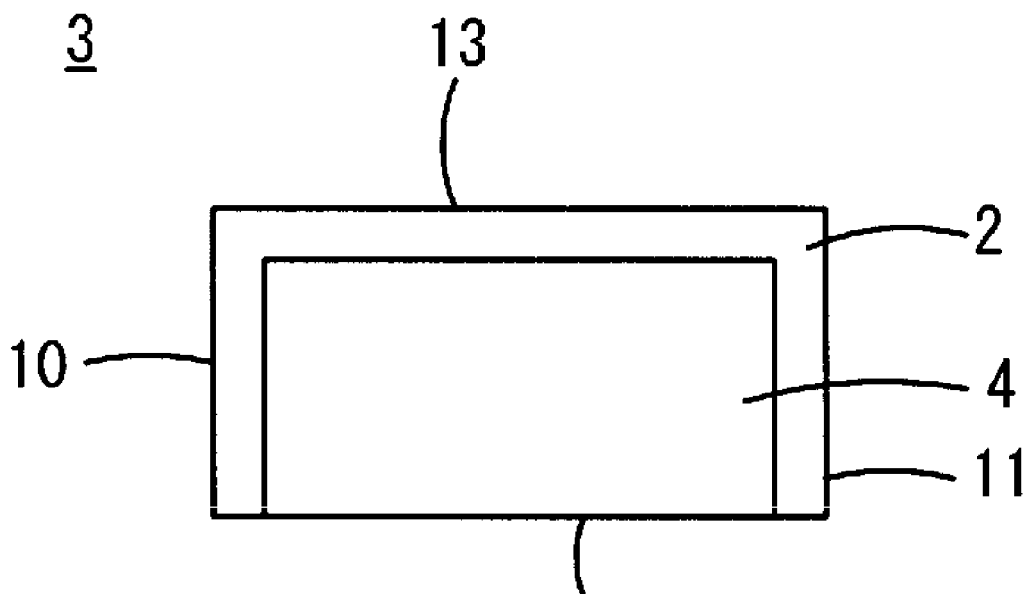
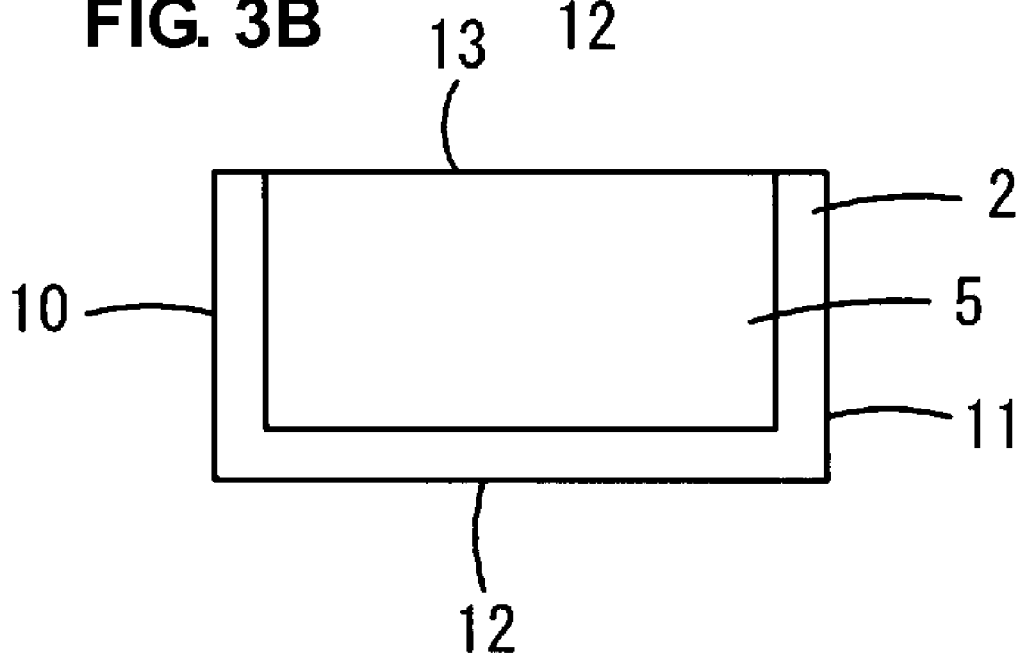


FIG. 3B



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.