



US005226056A

United States Patent [19]

[11] Patent Number: 5,226,056

Kikuchi et al.

[45] Date of Patent: Jul. 6, 1993

[54] PLASMA ASHING METHOD AND APPARATUS THEREFOR

[75] Inventors: Masashi Kikuchi, Fujisawa; Toshinari Takata, Chigasaki; Tokuo Watanabe, Yokosuka, all of Japan

[73] Assignee: Nihon Shinku Gijutsu Kabushiki Kaisha, Chigasaki, Japan

[21] Appl. No.: 462,380

[22] Filed: Jan. 9, 1990

[30] Foreign Application Priority Data

Jan. 10, 1989 [JP]	Japan	1-2042
Jan. 10, 1989 [JP]	Japan	1-2043
Jan. 10, 1989 [JP]	Japan	1-2044
Jan. 10, 1989 [JP]	Japan	1-2045

[51] Int. Cl.⁵ H04B 7/00

[52] U.S. Cl. 373/18; 373/62; 156/345; 156/643; 156/646; 204/164; 204/192.1; 219/121.11; 219/121.36; 219/121.37; 219/121.4; 219/390

[58] Field of Search 156/643, 646, 668, 345; 204/192 E, 164, 298; 373/40, 18, 22, 62; 219/10.55 E, 10.55 M, 10.67, 121.43, 390, 121.11, 121.36, 121.37, 121.4, 121.41, 383

[56] References Cited

U.S. PATENT DOCUMENTS

4,529,474	7/1985	Fujiyama et al.	156/643
4,533,820	8/1985	Shimizu	219/390
4,961,812	10/1990	Baerg et al.	156/643
4,983,254	1/1991	Fujimura et al.	156/643
5,034,086	7/1991	Sato	156/643

Primary Examiner—Bruce A. Reynolds

Assistant Examiner—Tu Hoang

Attorney, Agent, or Firm—Armstrong & Kubovcik

[57] ABSTRACT

In a method for plasma ashing a resist film coated on a substrate, the temperature of the substrate is controlled initially at temperatures below that at which explosion of the resist film occurs until a surface portion of a resist film has been removed. Thereafter, the substrate temperature is increased to remove the remaining portions of the resist film. An apparatus for conducting the method includes a plurality of supports, which may be movably disposed within a vacuum treatment chamber for moving the substrate away from a source of heat and for moving the substrate into contact with the heating source.

8 Claims, 10 Drawing Sheets

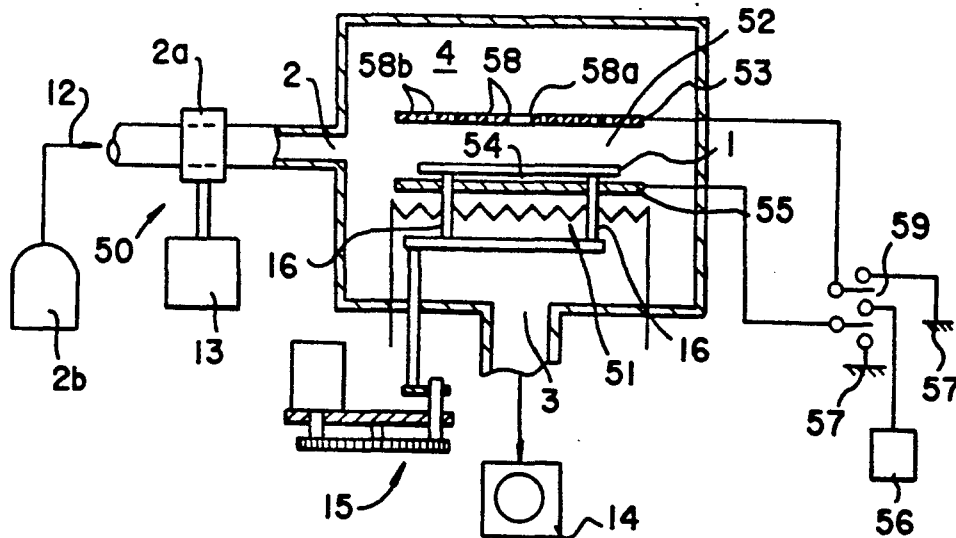


FIG.1 PRIOR ART

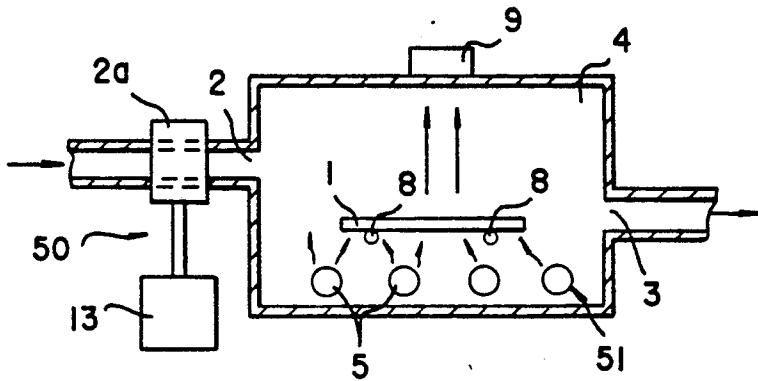


FIG.2 PRIOR ART

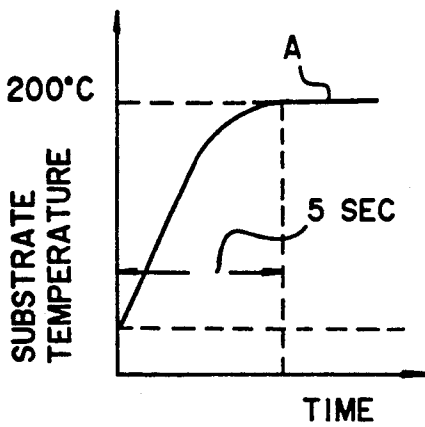
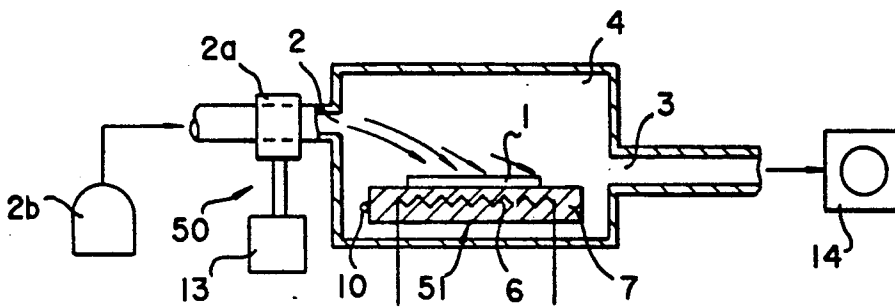


FIG.3 PRIOR ART

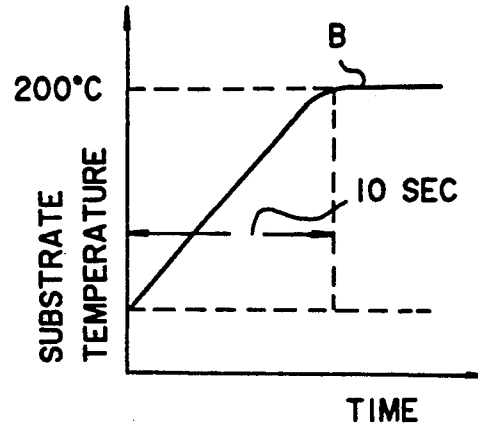


FIG.4 PRIOR ART

FIG.5
PRIOR ART

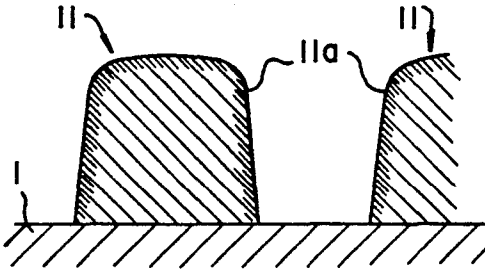


FIG.6
PRIOR ART

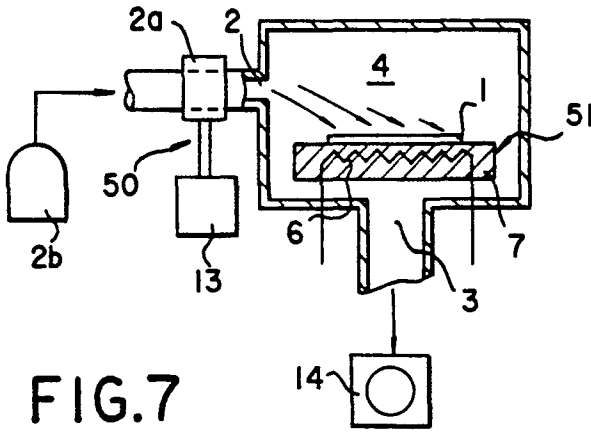
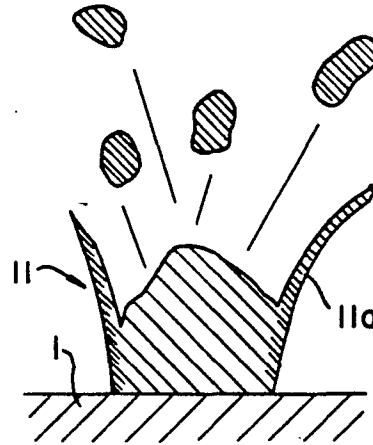


FIG.7
PRIOR ART

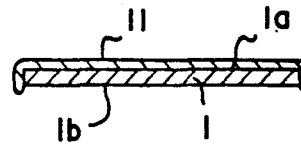


FIG.8
PRIOR ART

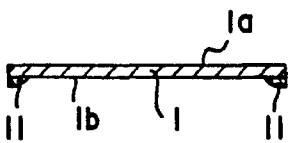


FIG.9
PRIOR ART

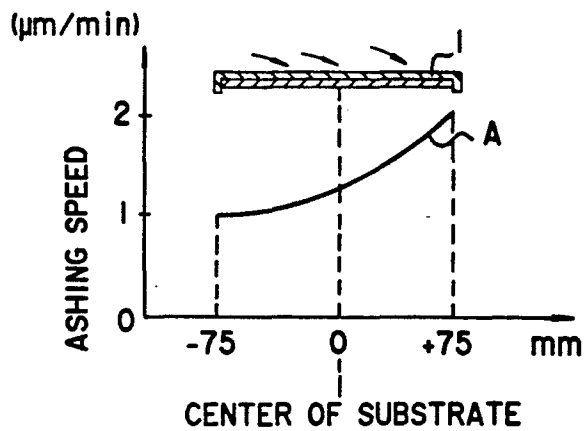


FIG.10
PRIOR ART

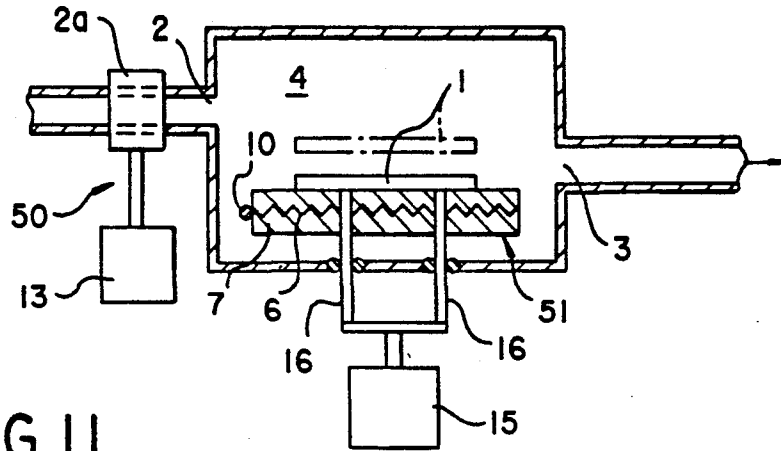


FIG. 11

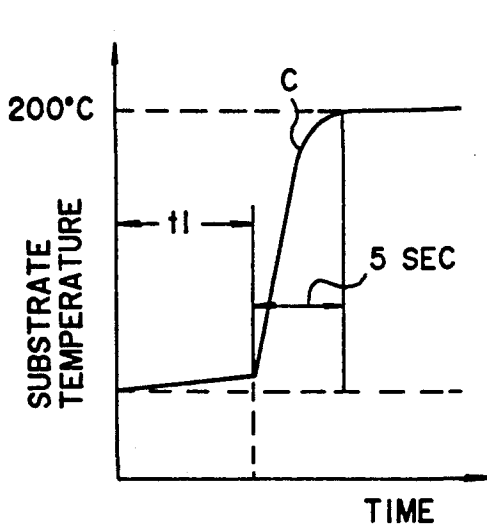


FIG. 12

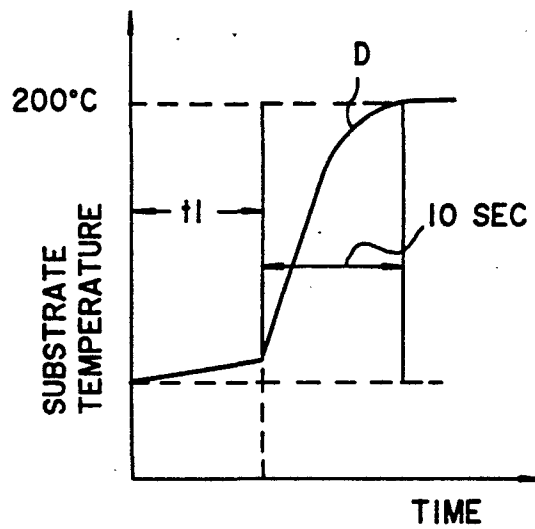


FIG. 13

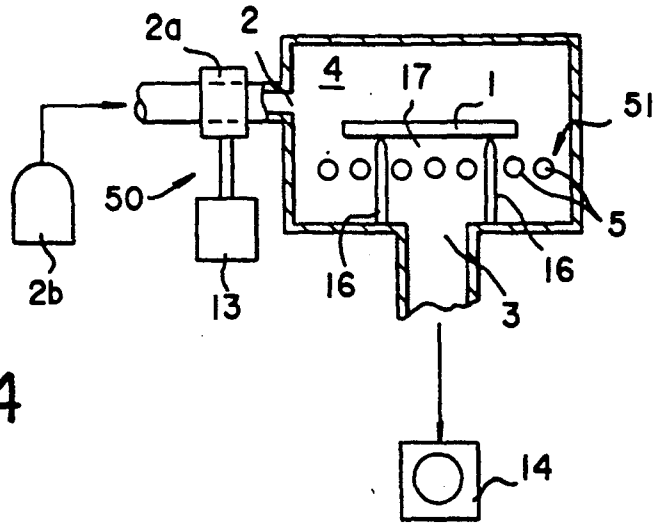


FIG. 14

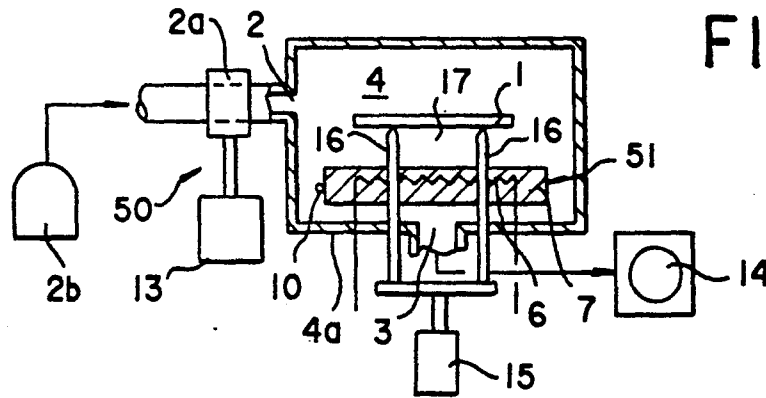


FIG. 15

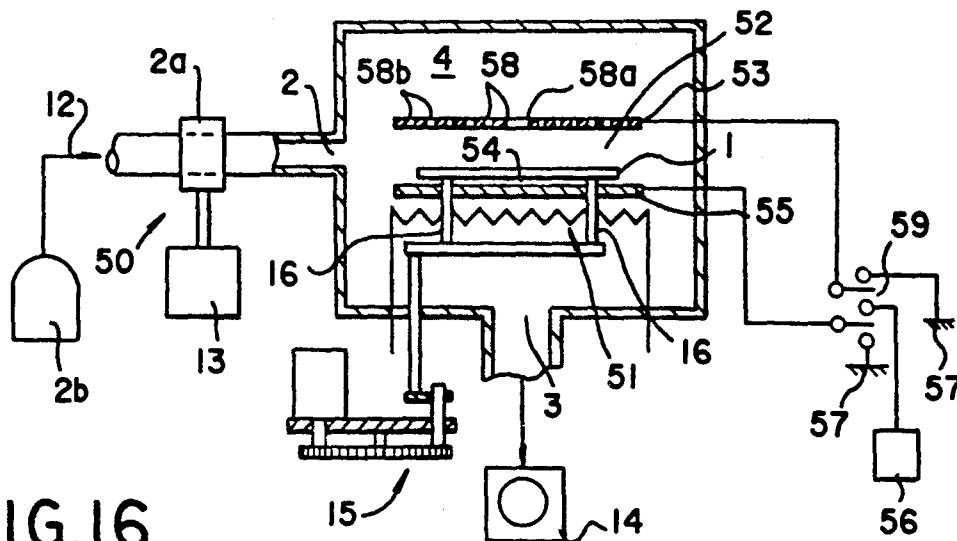


FIG. 16

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.