

US006063710A

United States Patent [19]

Kadomura et al.

6,063,710 **Patent Number:** [11]

Date of Patent: May 16, 2000 [45]

[54]		AND APPARATUS FOR DRY G WITH TEMPERATURE CONTROL
[75]	Inventors:	Shingo Kadomura; Tomohide Jozaki; Shinsuke Hirano, all of Kanagawa, Japan
[73]	Assignee:	Sony Corporation, Tokyo, Japan
[21]	Appl. No.:	08/804,412
[22]	Filed:	Feb. 21, 1997

	riicu.	reb. 21, 1997
[30]	For	eign Application Priority Data

,		
_		

			*
[51]	Int. Cl. ⁷	 	H01L 21/302
[52]	U.S. Cl.	 	

[58] 438/714, 715, 733, 738

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,971,653	11/1990	Powell et al 216/59
5,320,982	6/1994	Tsubone et al 437/228
5,584,971	12/1996	Komino 216/59
5,605,600	2/1997	Muller et al 216/67

5,681,780	10/1997	Mihara et al
5,711,851	1/1998	Blalock et al 156/643.1
5,900,105	5/1999	Toshima
5,900,162	5/1999	Kawahara et al 216/67
5,928,964	7/1999	Brankner 437/711
5,981,913	11/1999	Kadomura et al 219/444.1
6,004,882	12/1999	Kim et al 438/706
6,008,133	12/1999	Kumihashi et al 216/67

FOREIGN PATENT DOCUMENTS

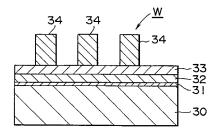
4302141A 10/1992 Japan.

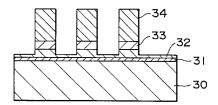
Primary Examiner—Randy Gulakowski Assistant Examiner—Anita Alanko Attorney, Agent, or Firm-Hill & Simpson

[57] **ABSTRACT**

A method of dry etching treatment capable of attaining both high selectivity and fine fabrication at a high accuracy simultaneously is provided, in which an etching treatment comprising a plurality of steps are applied to a specimen W in one identical processing apparatus, and the temperature of the specimen is changed between etching of one step and etching of another step succeeding thereto, among the plurality of the steps, thereby applying etching at temperatures different between the one step and the step succeeding thereto.

16 Claims, 4 Drawing Sheets





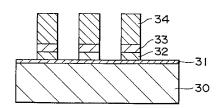




FIG. 1A

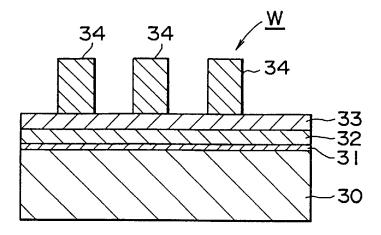


FIG. IB

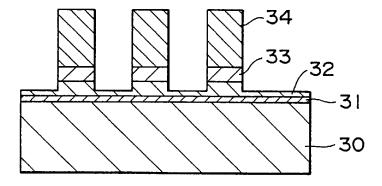


FIG. IC

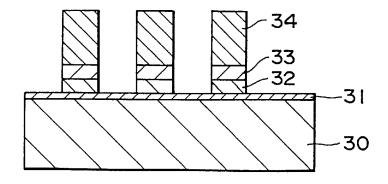
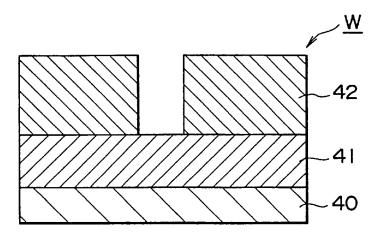
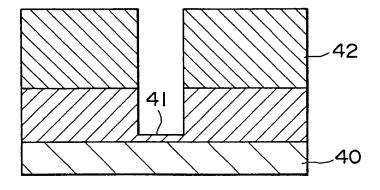


FIG. 2A



F I G. 2B



F I G. 2C

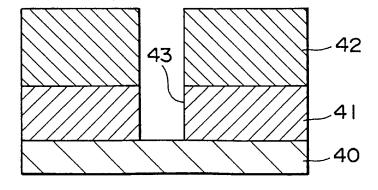
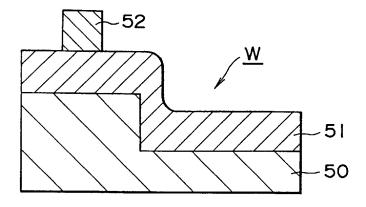


FIG. 3A



F I G. 3B

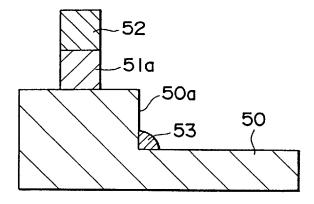
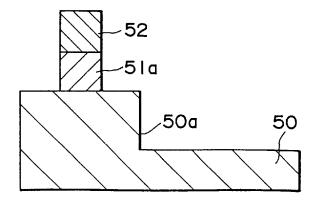
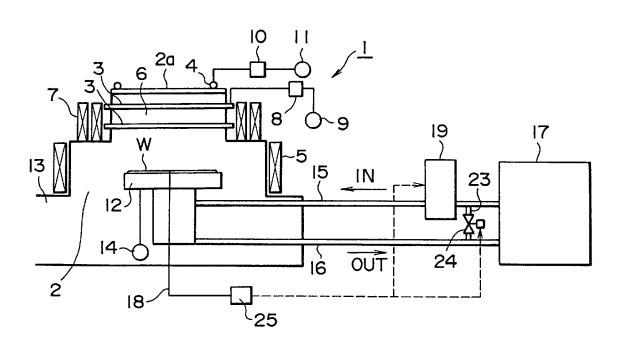


FIG. 3C

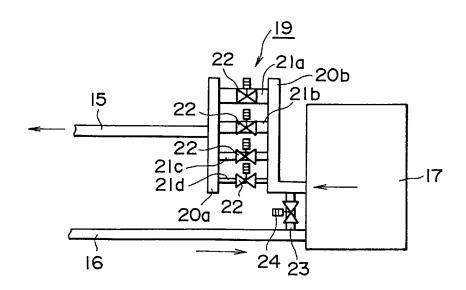


F I G. 4

May 16, 2000



F I G. 5



DOCKET A L A R M

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.

