United States Patent [19]

Ballard

[54] PROCESS FOR DEPOSITING A THIN-FILM LAYER OF MAGNETIC MATERIAL ONTO AN INSULATIVE DIELECTRIC LAYER OF A SEMICONDUCTOR SUBSTRATE

- [75] Inventor: Delbert L. Ballard, Northridge, Calif.
- [73] Assignee: Utah Computer Industries, Inc., Salt Lake City, Utah
- [21] Appl. No.: 539,729
- [22] Filed: Oct. 5, 1983
- [51] Int. Cl.³ H01L 21/316; H01L 21/94
- 365/171; 427/94; 427/96; 427/99; 427/131 [58] Field of Search 204/192 M; 427/94-96, 427/91, 99, 131; 365/171

[56] References Cited

U.S. PATENT DOCUMENTS

3,161,946	12/1964	Birkenbeil 204/192 M
3,573,485	4/1971	Ballard 307/406
3,702,991	11/1972	Bate et al 340/174 TF
3,800,193	3/1974	Ashar et al 317/235 R
4,149,301	4/1979	Cook 29/25.42

[11]	Patent Number:	4,529,621
[45]	Date of Patent:	Jul. 16, 1985

OTHER PUBLICATIONS

Petersen, "Thin Film Magnetic Heads," IBM TDB, vol. 21, No. 12, May 1979, p. 5002.

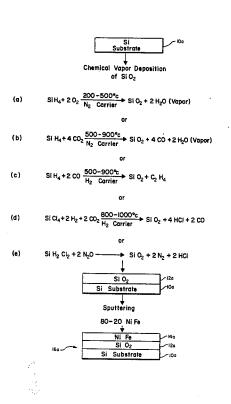
Ahn, "NiFe Films Mixed with SiO₂ for Improved Adhesion," IBM TDB, vol. 18, No. 10, Mar. 1976, p. 3523. C. Morosanu et al., "Thin Film Preparation by Plasma and Low Pressure CVD in a Horizontal Reactor," 31 Vacuum, 309–313, No. 7 (1981).

Primary Examiner—John D. Smith Attorney, Agent, or Firm—Workman, Nydegger & Jensen

[57] ABSTRACT

The present invention is directed to a process for depositing a thin-film layer of magnetic material onto an insulative dielectric layer of a semiconductor substrate such that the layer of magnetic material completely and permanently adheres to the insulative dielectric layer. A product within the scope of the present invention is prepared by taking a semiconductor substrate, such as a silicon wafer, and through a chemical-vapor deposition process depositing a layer of an insulative dielectric (such as the silicon dioxide or silicon nitride) on the layer, and subsequently depositing a layer of a magnetic material (such as a nickel-iron alloy or a manganese-bismuth alloy) through a sputtering process onto the insulative dielectric layer.

11 Claims, 5 Drawing Figures



IP Bridge Exhibit 2017

U.S. Patent Jul. 16, 1985

12 ~

10-

OCKF

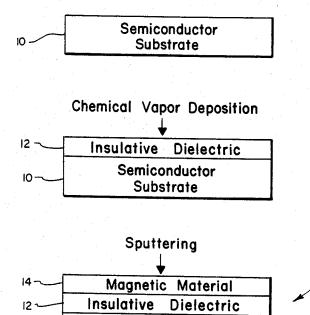
R

М

D

Α

16

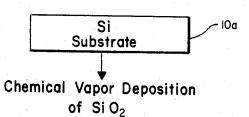


Semiconductor

Substrate

Fig. I

U.S. Patent Jul. 16, 1985



(a) Si H₄+ 2 O₂
$$\frac{200-500^{\circ}c}{N_2}$$
 Si O₂ + 2 H₂O (Vapor)
or

(b) Si H₄ + 4 CO₂
$$\frac{500 - 900^{\circ}c}{N_2 \text{ Carrier}}$$
 Si O₂ + 4 CO + 2 H₂O (Vapor)

or

(c) Si H₄ + 2 CO
$$\frac{500-900^{\circ}c}{H_2 \text{ Carrier}}$$
 Si O₂ + C₂ H₄

or

(d) Si Cl₄+2 H₂+2 CO₂
$$\frac{800-1000^{\circ}c}{H_2}$$
 Si O₂+4 HCl + 2 CO

or Si H₂ Cl₂ + 2 N₂O ---(e) Si 0₂ + 2 N₂ + 2 HCI Si O₂ -12a Si Substrate 10a Sputtering 80-20 Ni Fe ¥ Ni Fe 14a Si O₂ -12a 16a -Si Substrate 10a

Α

Fig.2

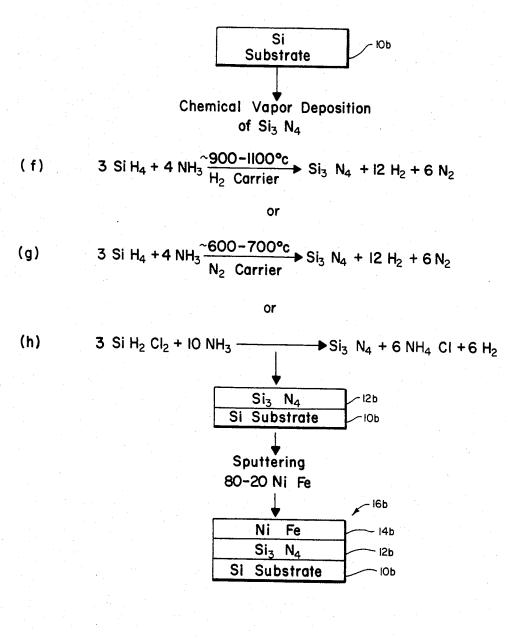
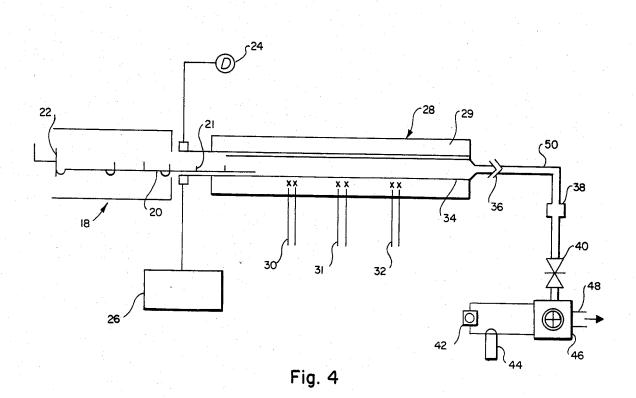
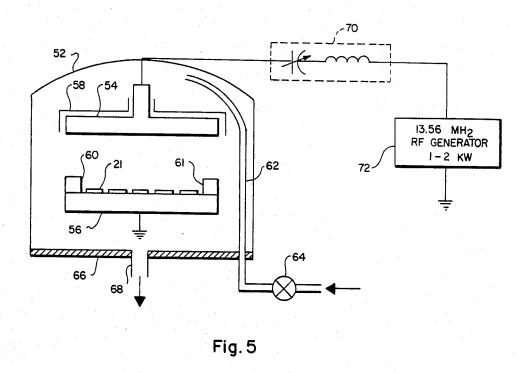


Fig. 3

Δ





`KF Find authenticated court documents without watermarks at docketalarm.com. R М

Α

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.