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United States Patent [19]

Sproul et al.

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[54] **METHOD FOR SPUTTERING COMPOUNDS ON A SUBSTRATE**

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[73] Assignee: **Northwestern University**, Evanston, Ill.

[*] Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

[21] Appl. No.: **08/635,472**

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[51] **Int. Cl.**[6] **C23C 14/34**

[52] **U.S. Cl.** **204/192.13**; 204/192.15; 204/192.16; 204/192.22; 204/192.23; 204/192.25; 204/298.03; 204/298.07; 204/298.06; 204/298.08; 204/298.14

[58] **Field of Search** 204/192.13, 192.15, 204/192.22, 192.23, 192.25, 298.03, 298.07, 298.08, 298.14, 298.26, 298.06, 192.16

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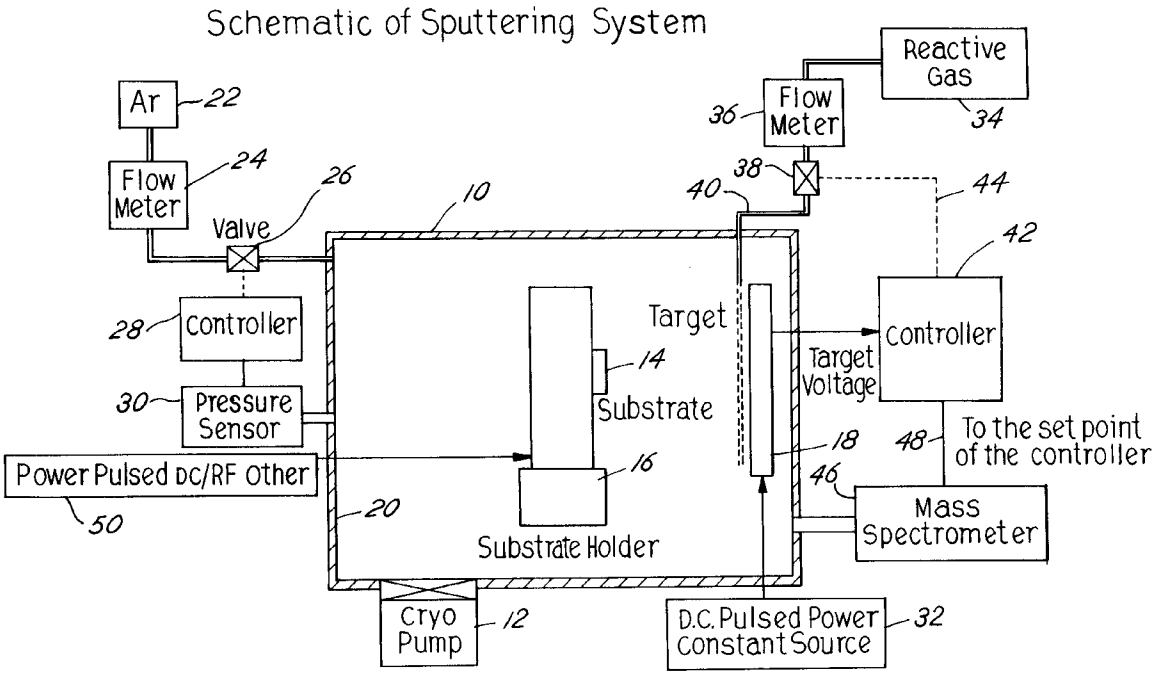
[57] **ABSTRACT**

A method and apparatus for monitoring and controlling deposition of metal, insulating compounds or other compounds on a substrate by sputtering techniques includes maintaining pulsed, constant, direct current power to the target, sensing the voltage of the target material used in the process, simultaneously rapidly sensing the partial pressure of the reactive gas, and simultaneously biasing the substrate to activate the reactive gas or otherwise energizing the reactive gas in the vicinity of the substrate. An apparatus for practicing the invention is also disclosed.

13 Claims, 5 Drawing Sheets



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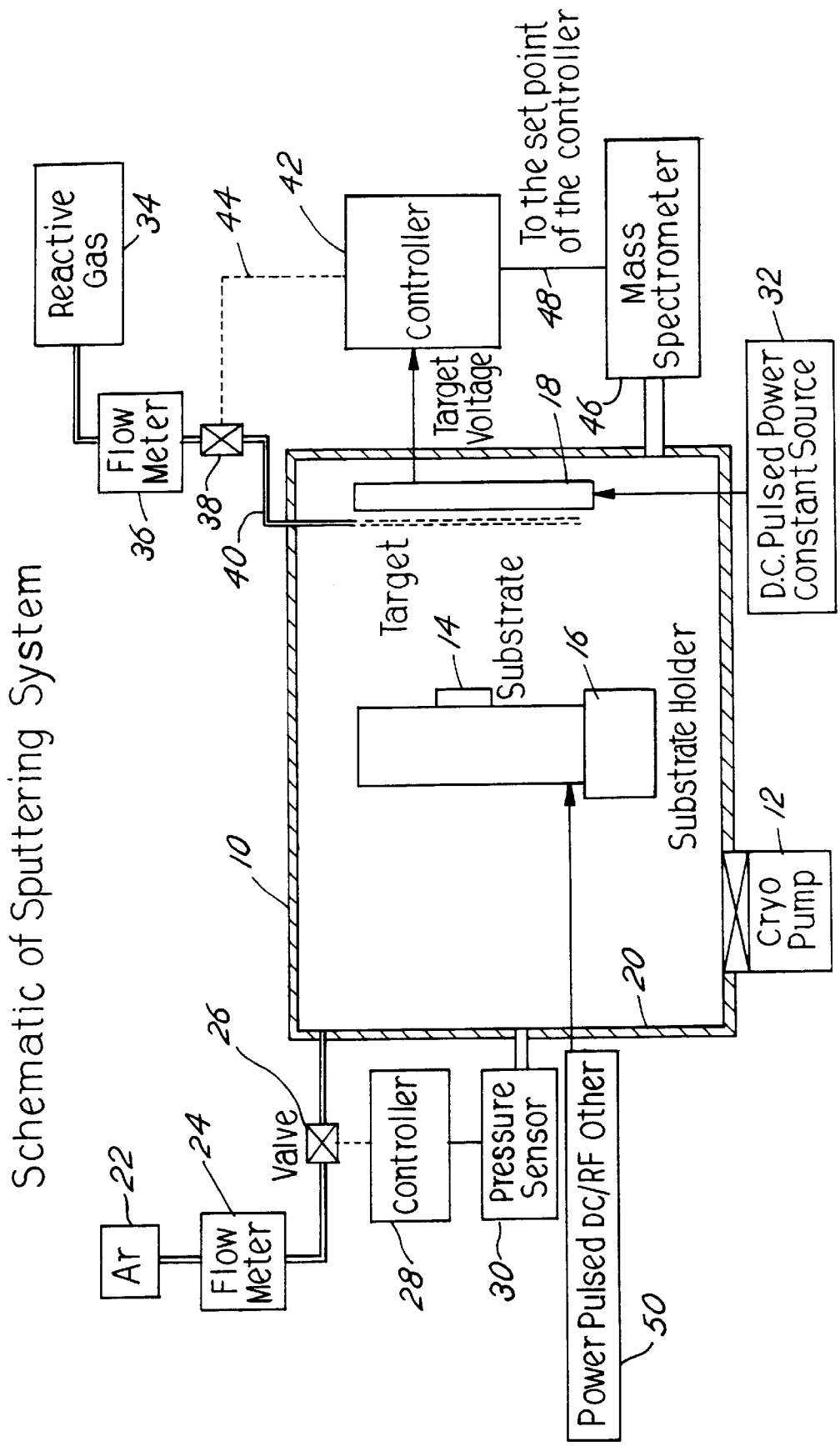


FIG. 1
Schematic of Sputtering System

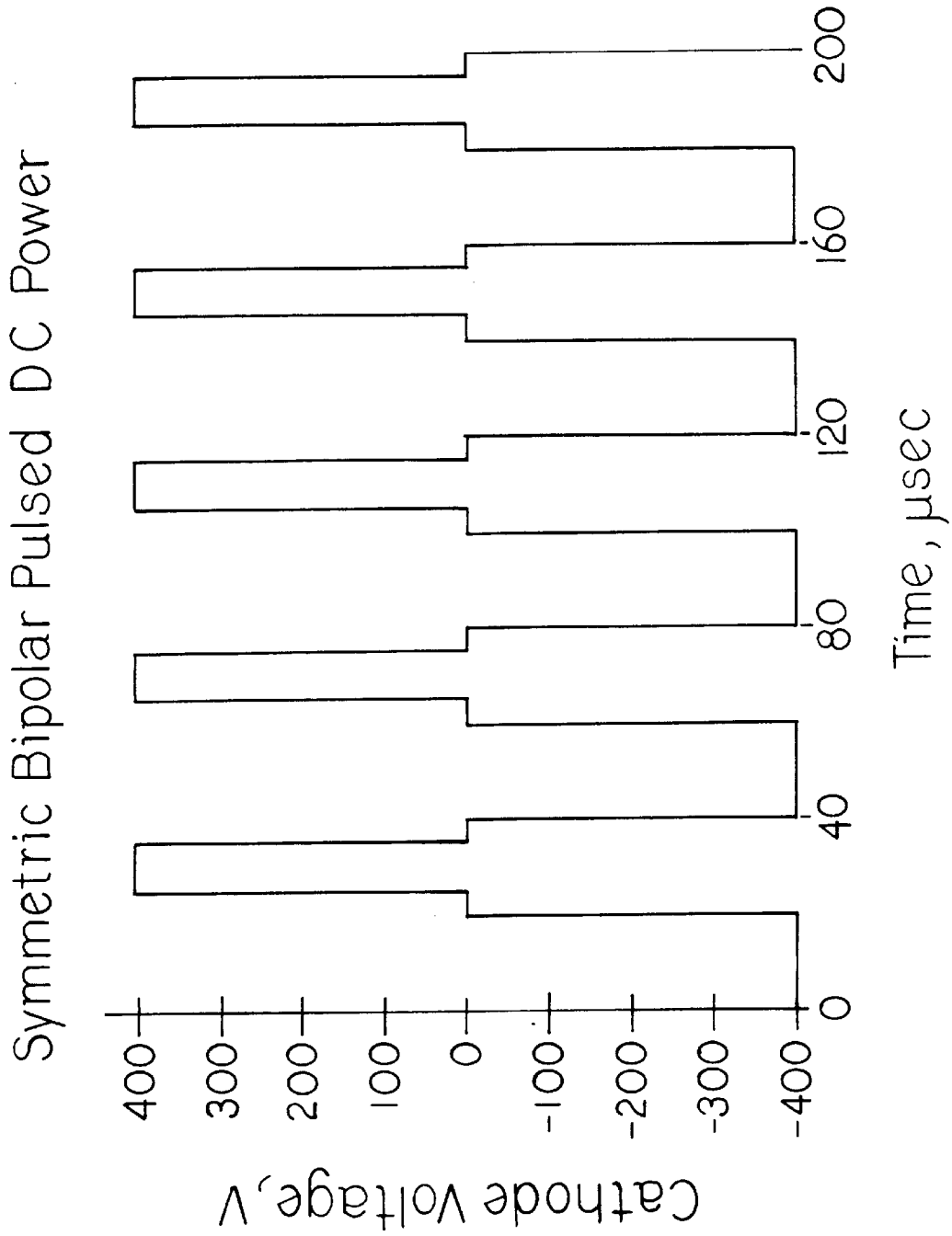
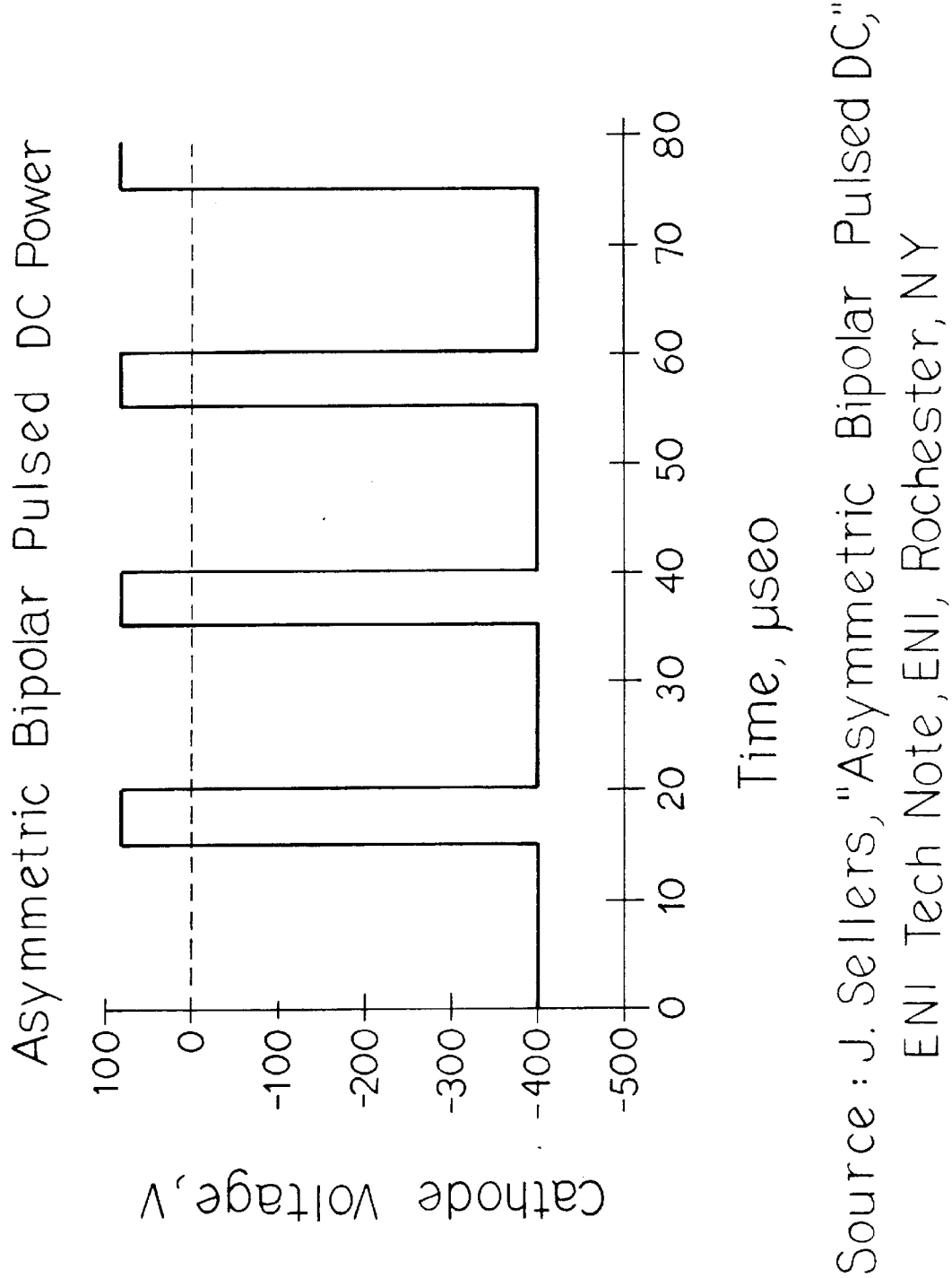


FIG.2

FIG.3



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