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United States Patent [19]

Moslehi

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[54] **LAMP-HEATED CHUCK FOR UNIFORM WAFER PROCESSING**

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[73] Assignee: **Texas Instruments**, Dallas, Tex.

[21] Appl. No.: **63,110**

[22] Filed: **May 17, 1993**

Related U.S. Application Data

[63] Continuation of Ser. No. 774,677, Oct. 11, 1991, abandoned.

[51] **Int. Cl.**[6] **H05B 3/00;** H01L 21/027; F27D 11/00

[52] **U.S. Cl.** **392/416;** 118/724; 118/50.1

[58] **Field of Search** 392/416–418; 219/405, 411, 390; 118/724, 725, 728, 730, 50.1; 250/492.1; 427/55, 50, 51, 585, 586, 592, 557, 569

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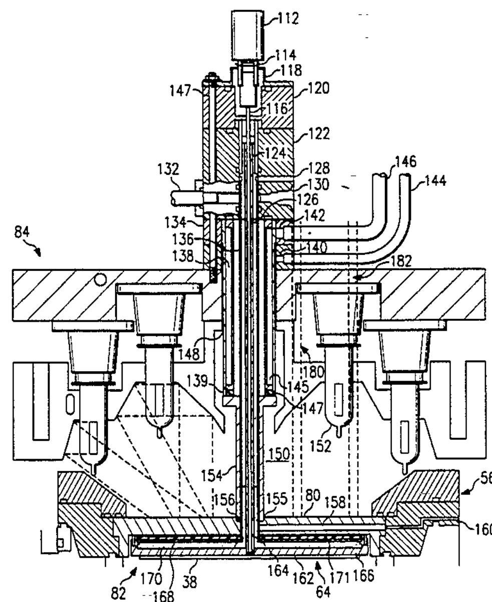
[57] **ABSTRACT**

A chuck **(82)** for lamp-heated thermal and plasma semiconductor wafer **(38)** processing comprises an absorbing surface **(171)** for absorbing optical energy from an illuminator module **(84)** that transforms the electrical energy into radiant optical energy. Chuck **(82)** includes an absorbing surface **(171)** that absorbs optical energy and distributes the resultant thermal energy. From the absorbing surface, a contact surface **(168)** conducts the heat energy to semiconductor wafer **(38)** and uniformly heats the semiconductor wafer **(38)** with the distributed thermal energy. Chuck **(82)** not only provides significantly improved process temperature uniformity, but also allows for the generation of RF plasma for plasma-enhanced fabrication processes as well as for in-situ chamber cleaning and etching. Additionally, chuck **(82)** provides at least two methods of determining semiconductor wafer temperature; a direct reading thermocouple **(112)** and association with the pyrometry sensor of illuminator module **(84)**. Other features of chuck **(82)** are that it is thermally decoupled from the thermal mass of fabrication reactor **(50)** and establishes an environment for purging optical quartz window **(80)** surface and semiconductor wafer **(38)** backside in order to prevent deposition on wafer backside and the quartz window.

5 Claims, 8 Drawing Sheets



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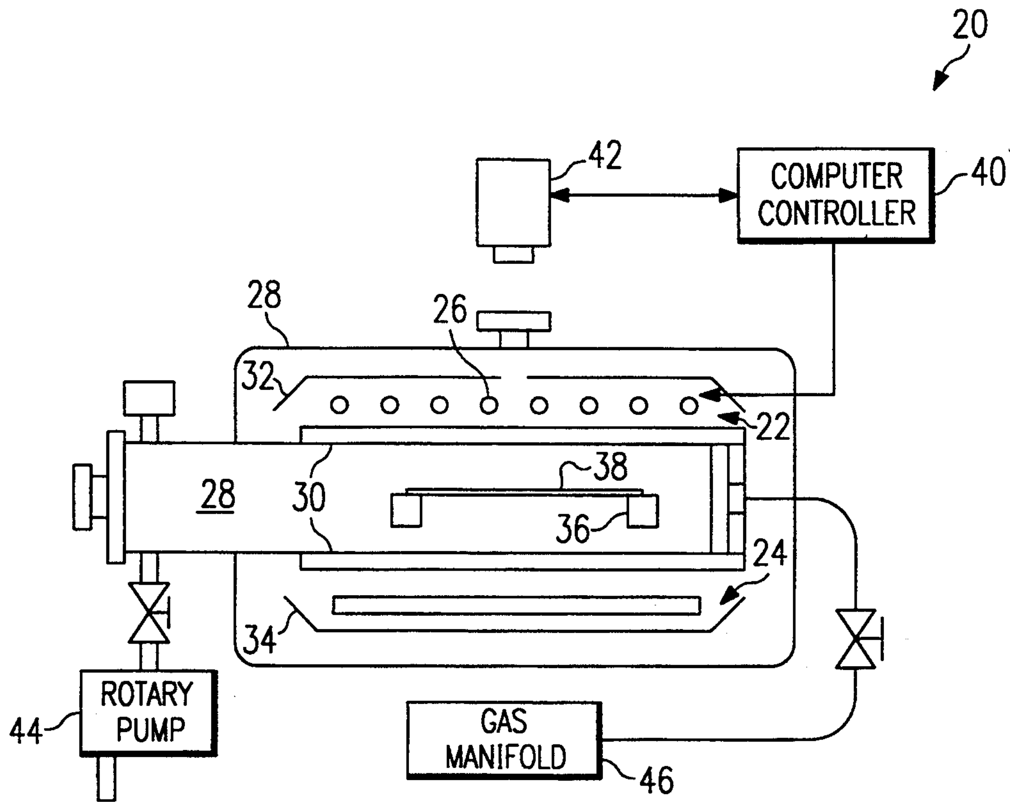

FIG. 1
(PRIOR ART)

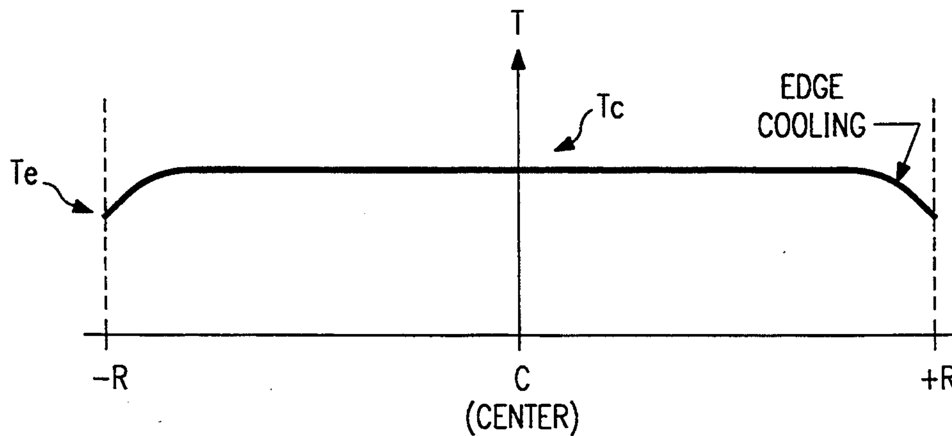

FIG. 2

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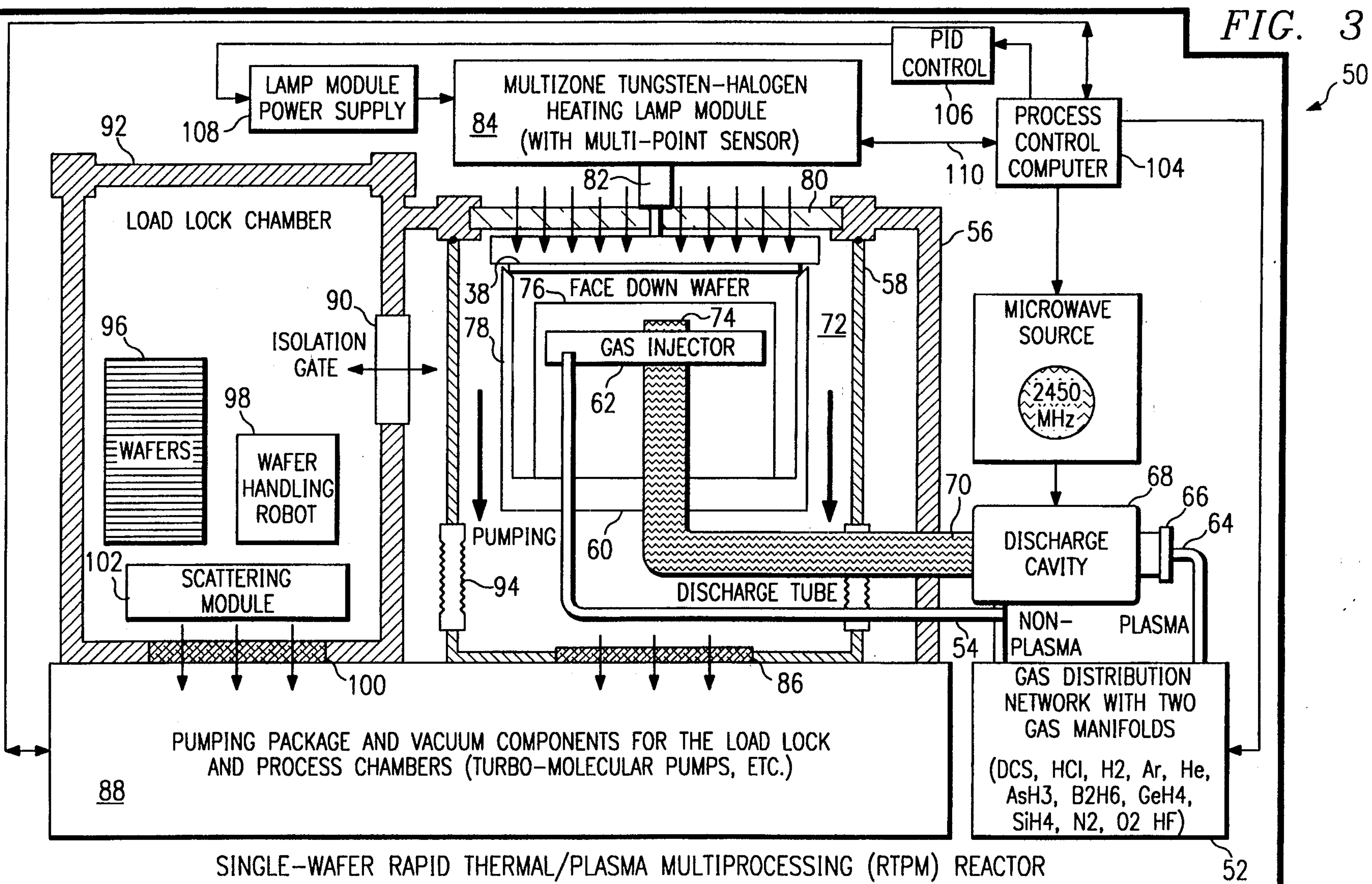

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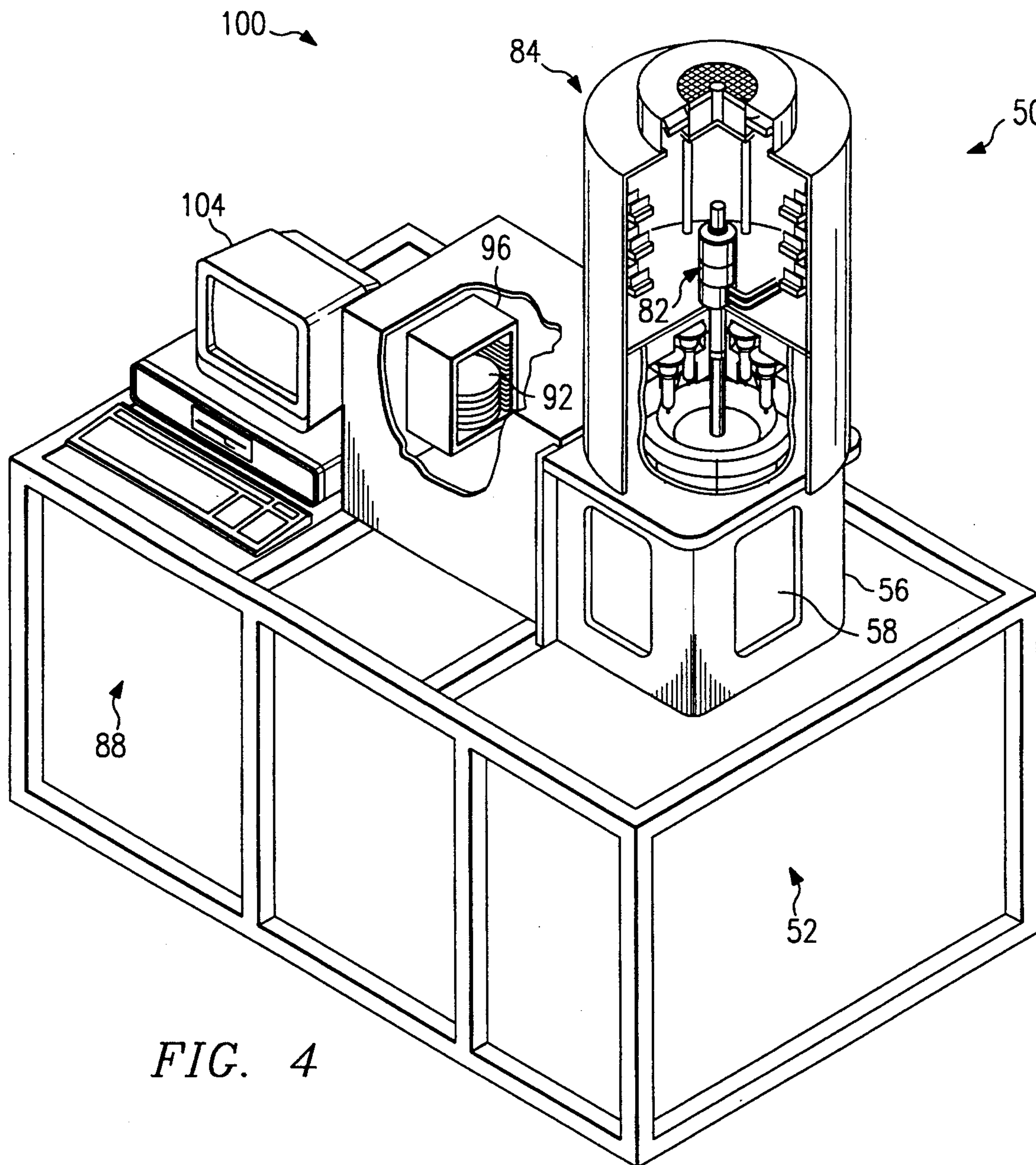

FIG. 4

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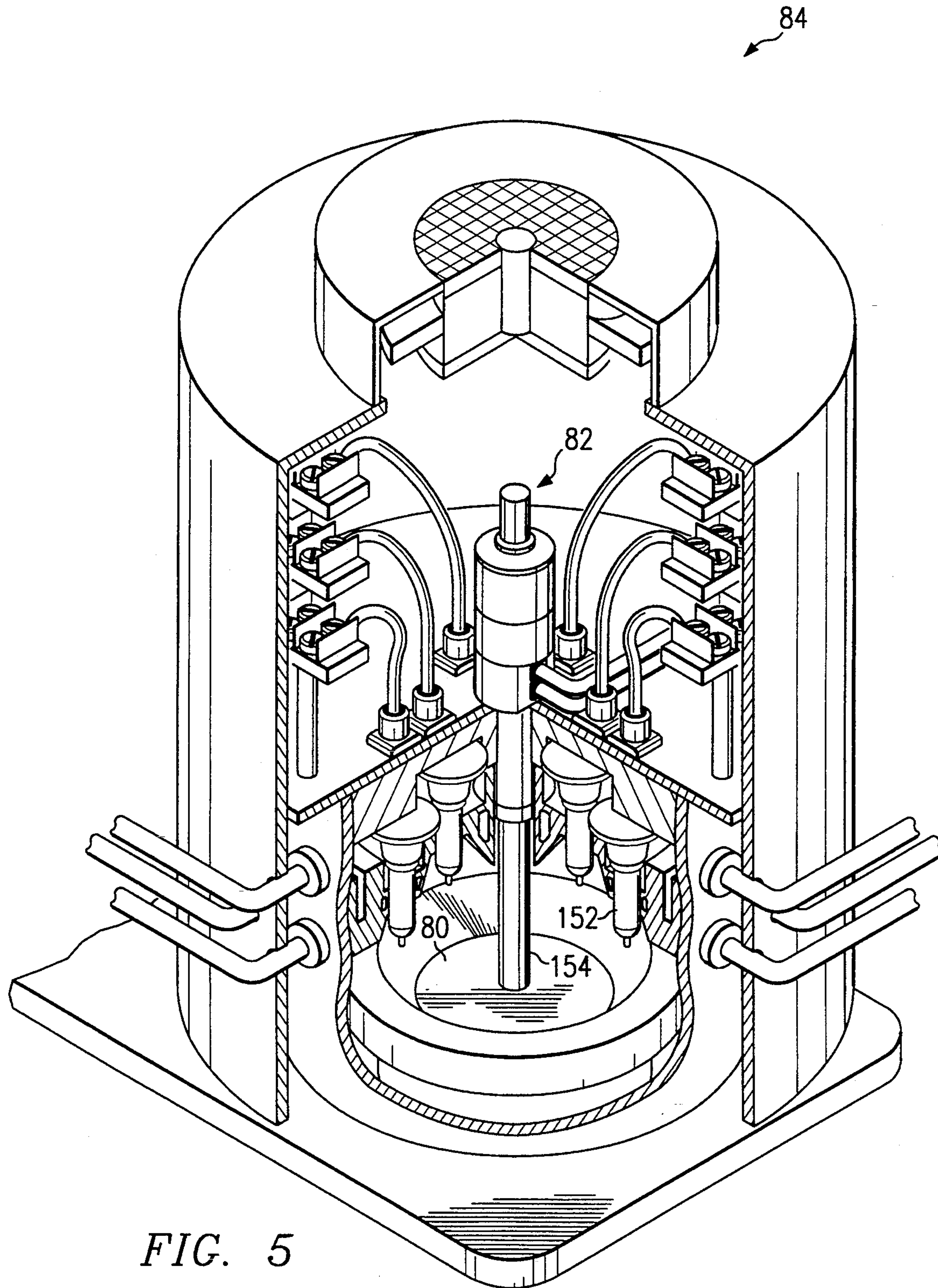

FIG. 5

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