



US006762849B1

(12) **United States Patent**  
**Rulkens**

(10) **Patent No.:** **US 6,762,849 B1**  
(45) **Date of Patent:** **Jul. 13, 2004**

(54) **METHOD FOR IN-SITU FILM THICKNESS MEASUREMENT AND ITS USE FOR IN-SITU CONTROL OF DEPOSITED FILM THICKNESS**

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6,226,086 B1 5/2001 Holbrook et al.  
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\* cited by examiner

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 121 days.

(57) **ABSTRACT**

A method and system for real-time, in-situ measurement of a film being deposited onto a surface of a wafer in a tool during semiconductor, optical component and electro-optic component processing and manufacturing. The method and system include real-time, in-situ detecting and analyzing radiation within the tool which is reflected off a wafer surface and subsequently diffusely reflected off internal roughened surfaces of the processing chamber. The emitted radiation may be derived from the plasma within the chamber, or alternatively, an external energy source. In detecting and analyzing the radiation reflected off the internal surfaces of the processing tool, the instant method and system monitors the deposition process of the film and automatically controls the deposition of such film in response to the measurements taken.

(21) Appl. No.: **10/176,118**

(22) Filed: **Jun. 19, 2002**

(51) **Int. Cl.**<sup>7</sup> ..... **G01B 9/07; G01B 4/28**

(52) **U.S. Cl.** ..... **356/630; 356/503**

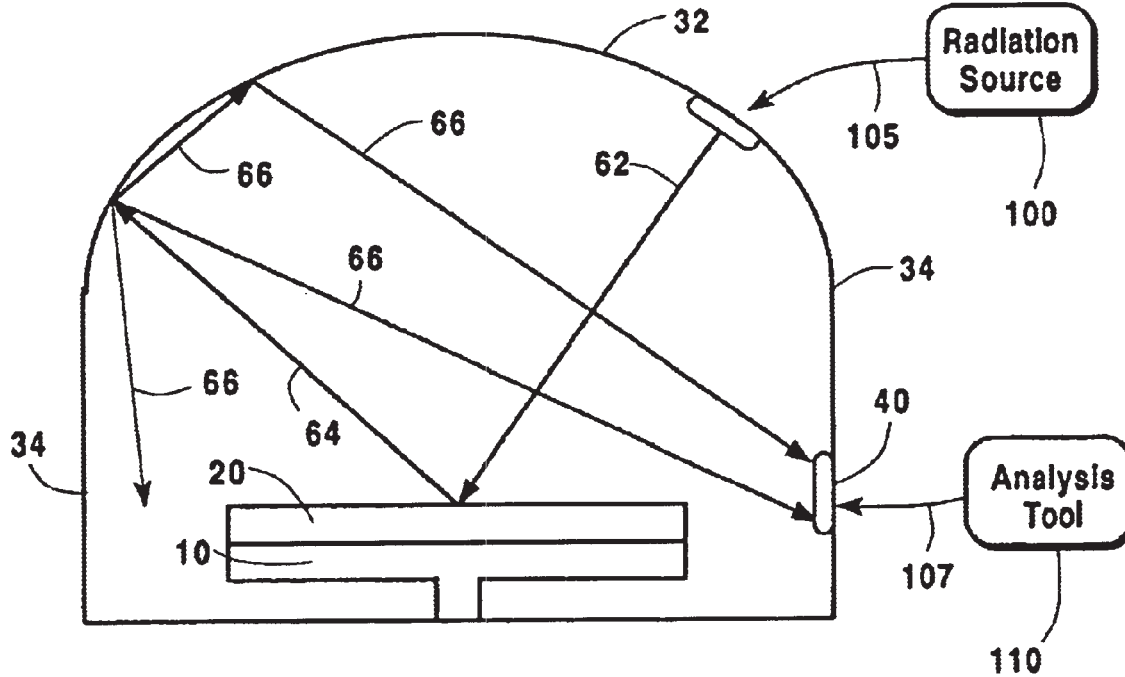
(58) **Field of Search** ..... 356/503, 630, 356/632, 492, 485

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**36 Claims, 5 Drawing Sheets**



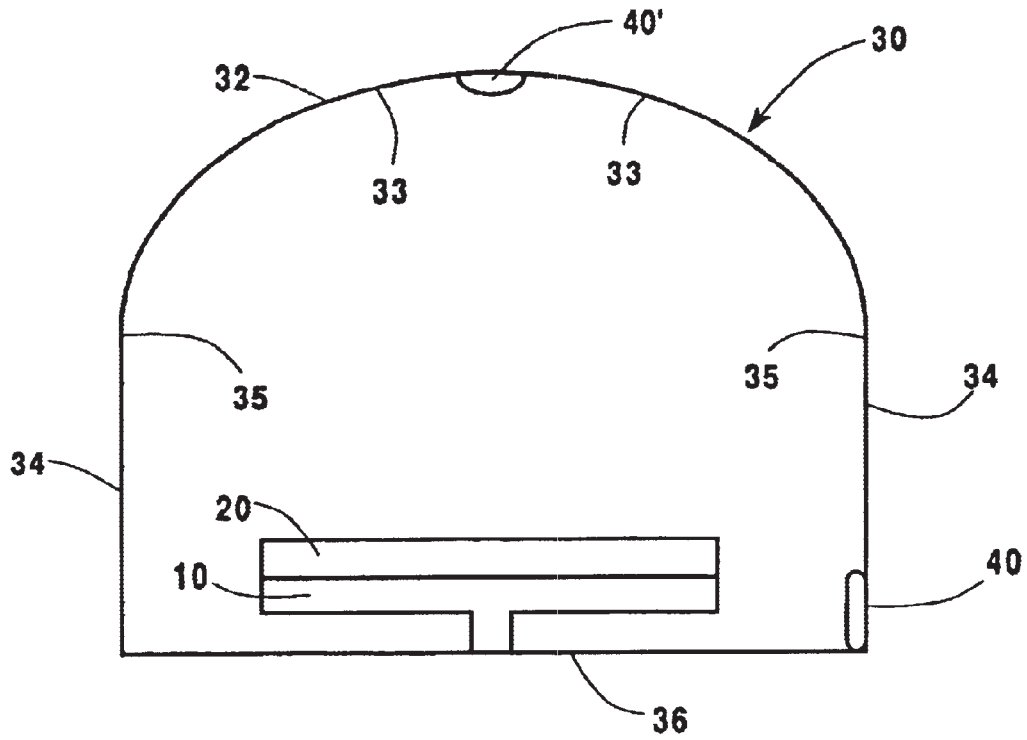


FIG. 1

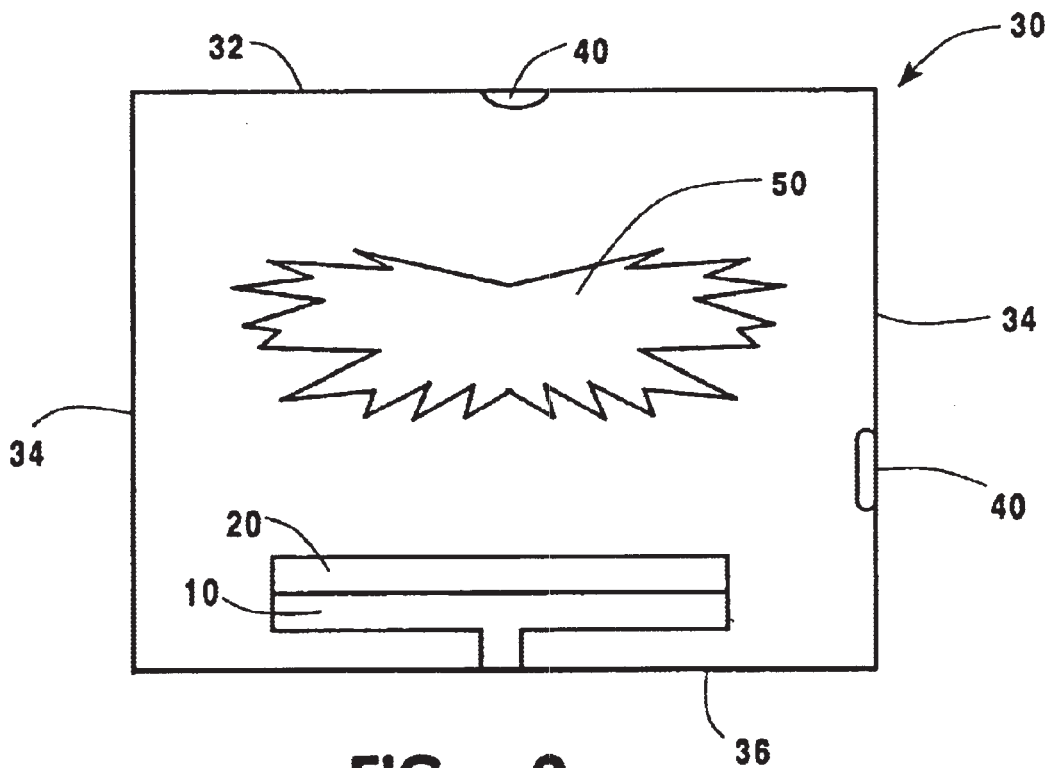


FIG. 2

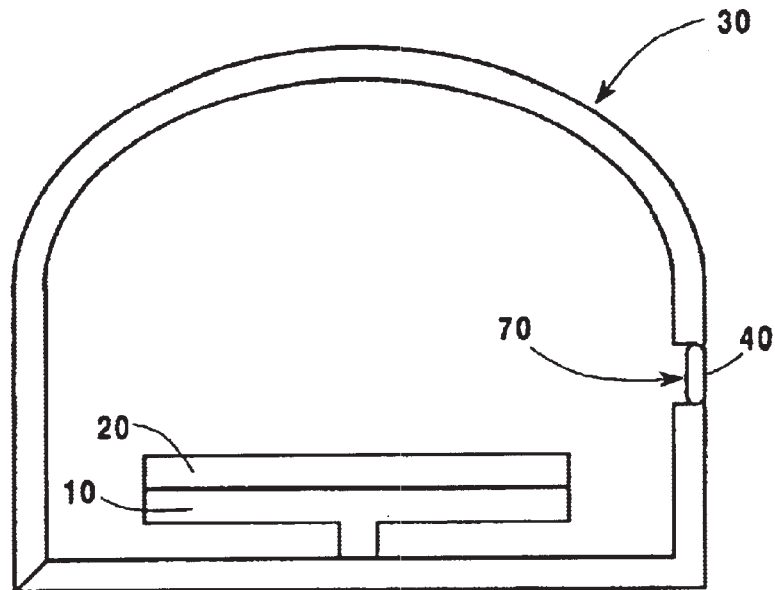


FIG. 3A

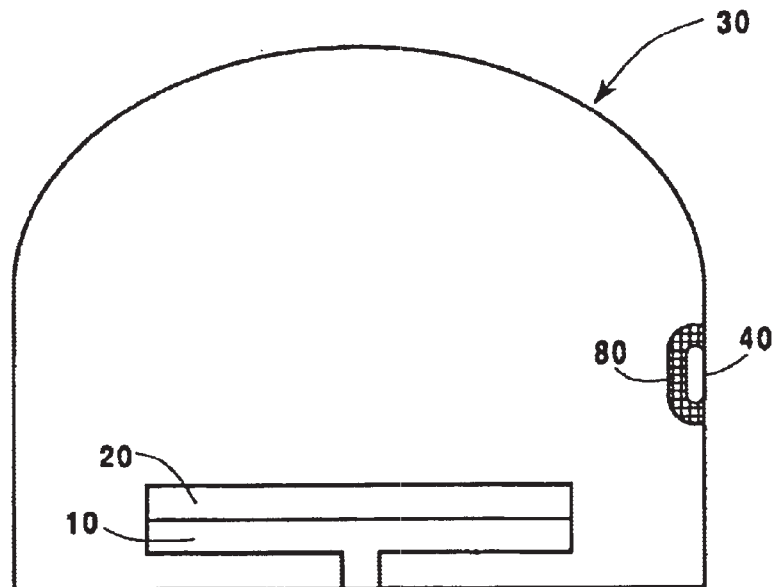


FIG. 3B

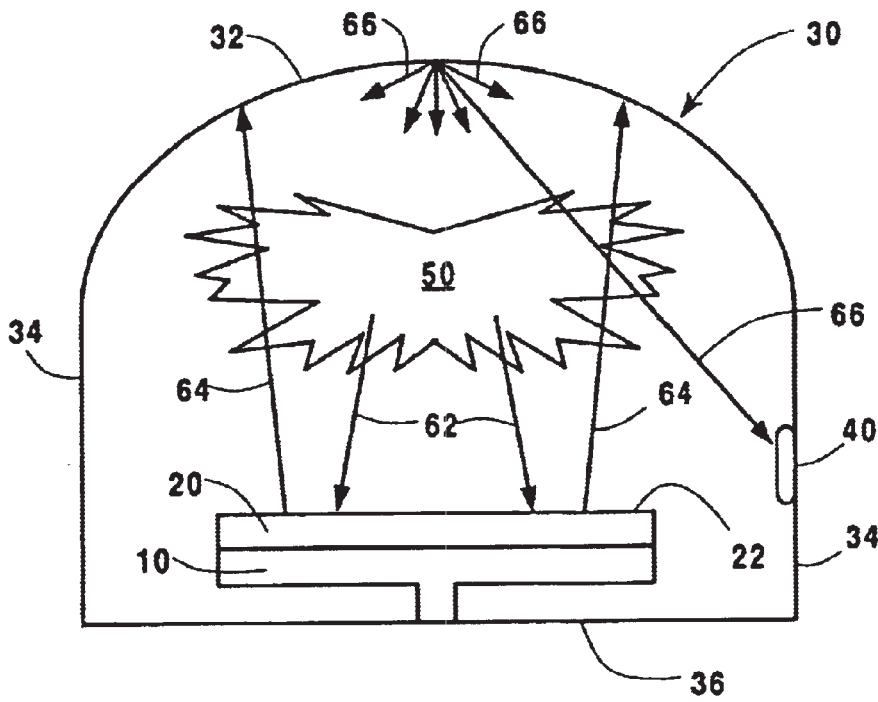


FIG. 4

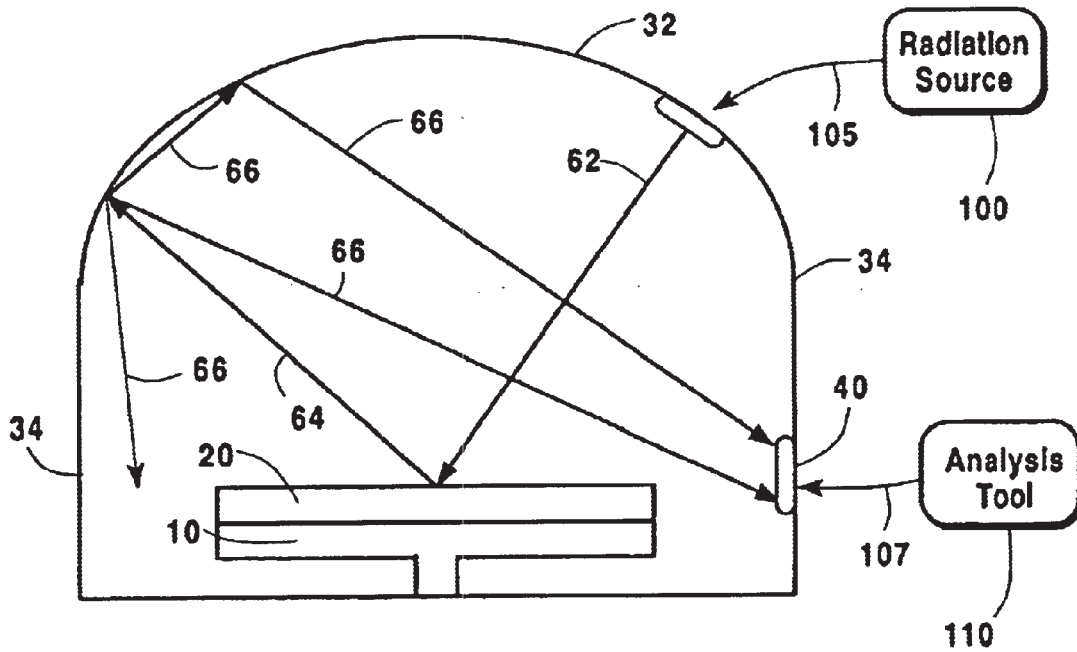


FIG. 5

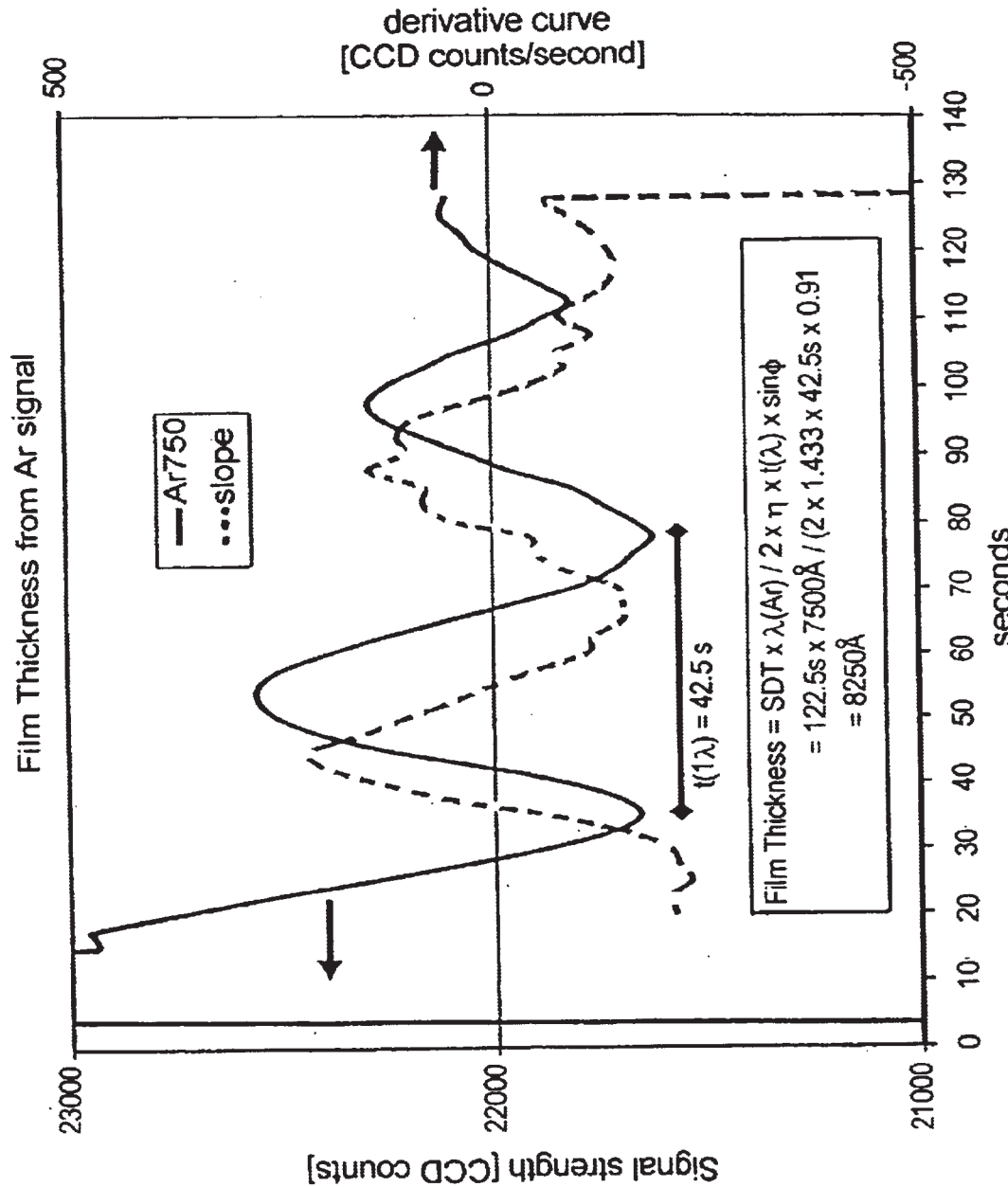


FIG. 6

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