

United States Patent [19]
Cheung et al.

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[54] **METHOD AND APPARATUS FOR DEPOSITING ANTIREFLECTIVE COATING**

1-187239 7/1989 Japan .
 6-240459 8/1994 Japan .

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Related U.S. Application Data

[63] Continuation-in-part of application No. 08/567,338, Dec. 5, 1995, abandoned.

[51] **Int. Cl.**⁶ **C23C 14/54**

[52] **U.S. Cl.** **204/192.28; 427/569; 427/579; 438/636; 438/786; 438/787; 438/788; 438/792**

[58] **Field of Search** **204/192.28; 427/569, 427/579; 438/636, 786, 787, 788, 792**

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[57] **ABSTRACT**

A stable process for depositing an antireflective layer. Helium gas is used to lower the deposition rate of plasma-enhanced silane oxide, silane oxynitride, and silane nitride processes. Helium is also used to stabilize the process, so that different films can be deposited. The invention also provides conditions under which process parameters can be controlled to produce antireflective layers with varying optimum refractive index, absorptive index, and thickness for obtaining the desired optical behavior.

37 Claims, 3 Drawing Sheets

EFFECT OF INCREASE ON				
INCREASE IN:	n	k	t	r
TEMPERATURE	↑	↑	↑	↑
PRESSURE	↓	↓	↓	↓
POWER	↓	↓	↑	↓
SPACING	↓	↓	↓	↓
SiH ₄	↑	↑	↑	↑
N ₂ O	↓	↓	↑	↓
NH ₃	↑	↓	↑	↓
N ₂	↓	↓	↑	↓
He	↑	↑	↓	↑
TOTAL GAS FLOW	↑	↑	↑	↑

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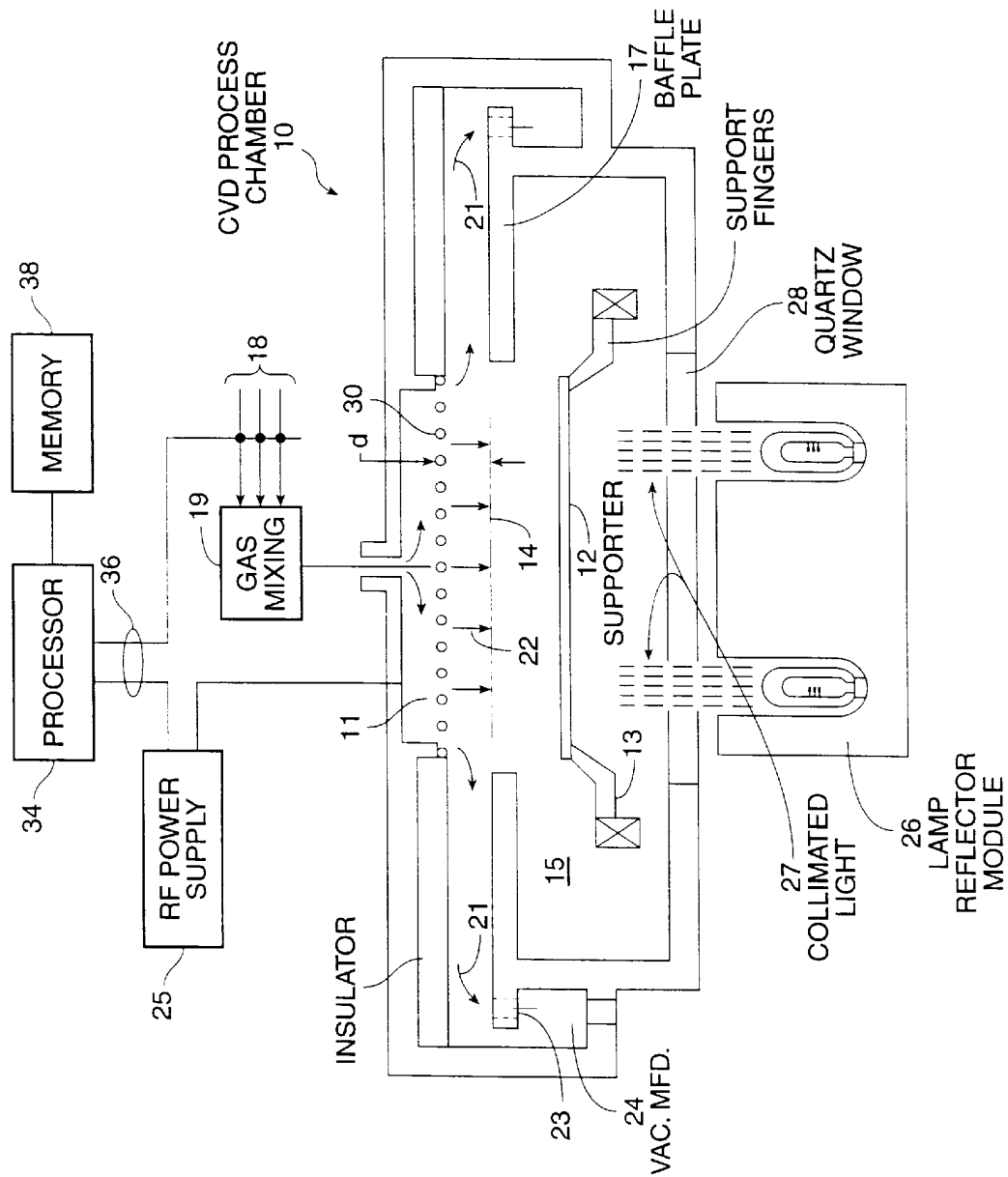


FIG. 1

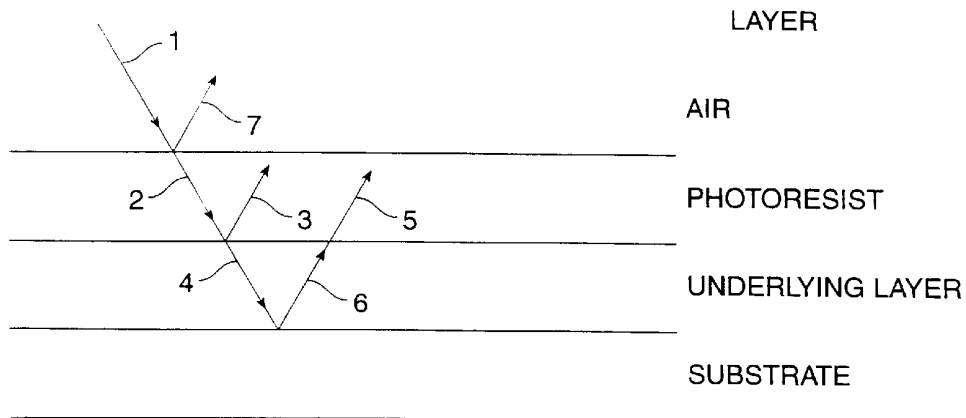


FIG. 2

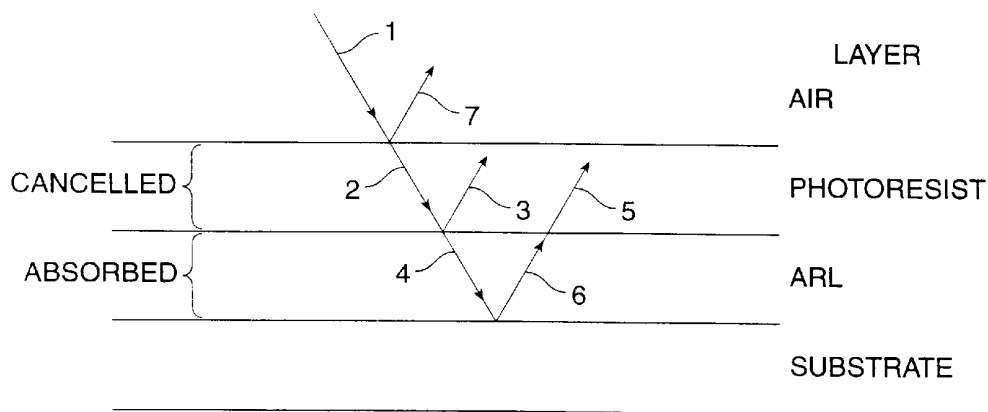


FIG. 3

INCREASE IN:	EFFECT OF INCREASE ON			
	n	k	t	r
TEMPERATURE	↑	↑	↑	↑
PRESSURE	↓	↓	↓	↓
POWER	↓	↓	↑	↓
SPACING	↓	↓	↓	↓
SiH ₄	↑	↑	↑	↑
N ₂ O	↓	↓	↑	↓
NH ₃	↑	↓	↑	↓
N ₂	↓	↓	↑	↓
He	↑	↑	↓	↑
TOTAL GAS FLOW	↑	↑	↑	↑

FIG. 4

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