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(71) **Applicant:** **APPLIED MATERIALS, INC.** [US/US];
3050 Bowers Avenue, Santa Clara, California 95054 (US).

(72) **Inventors:** **WU, Banqiu**; Applied Materials, Building 6,
3330 Scott Boulevard, Santa Clara, California 95051 (US).
MAKHAMREH, Khalid; 3320 Scott Boulevard, Building

6, Santa Clara, California 95052 (US). **DAGAN, Eliyahu Shlomo**; 3320 Scott Boulevard M/S 1111, Santa Clara, California 95052 (US).

(74) **Agent:** HALE, Jeffrey D. et al.; MOSER TABOADA,
1030 Broad Street, Suite 203, Shrewsbury, New Jersey
07702 (US).

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(54) Title: METHODS AND APPARATUS FOR RUTHENIUM OXIDE REDUCTION ON EXTREME ULTRAVIOLET PHOTO MASKS

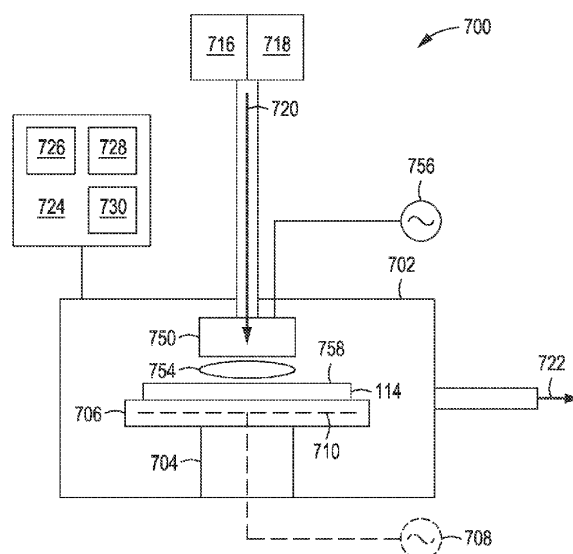


FIG. 7

(57) **Abstract:** Methods and apparatus for reducing ruthenium oxide on an extreme ultraviolet (EUV) photomask leverage temperature, plasma, and chamber pressure to increase the reduction. In some embodiments, a method includes heating the EUV photomask with a ruthenium (Ru) capping layer with a top surface which has a Ru oxide layer to a temperature of approximately 100 degrees Celsius to approximately a thermal budget of the EUV photomask, flowing a reducing agent gas into an EUV photomask processing chamber, and pressurizing the EUV photomask processing chamber to a process pressure to increase a reducing reaction between the reducing agent gas and a Ru oxide layer on the Ru capping layer. Other embodiments may incorporate remote plasma generators or atmospheric-pressure plasma generators to enhance the reduction of Ru oxides on the Ru capping layer.

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