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(54) Title: DEPOSITION OF METAL-CONTAINING FILMS USING HALOGEN-CONTAINING ACTIVATOR MOLECULES

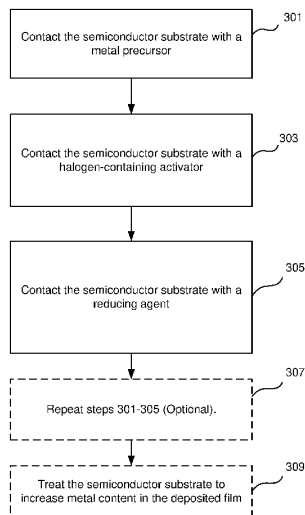


Figure 3A

(57) Abstract: Metal-containing films, such as molybdenum and molybdenum carbide films are deposited on a semiconductor substrate in a deposition process modulated by addition of a halogen-containing activator molecule (e.g., an alkyl halide, a halosilane or I₂). In some implementations, the substrate is first contacted with a metal-containing precursor (e.g., MoCl₅), followed by a halogen-containing activator (e.g., t-butyl chloride), and followed by a reducing agent (e.g., H₂). The process may be repeated as many times as necessary to form a film of a desired thickness. In some embodiments, metal films are formed by these methods and are deposited inside recessed features on the substrate to fill the recessed features. In other embodiments metal carbide films (e.g., molybdenum carbide films) are deposited by these methods as liners between dielectric and metal layers.

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