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(54) **REACTORS HAVING GAS DISTRIBUTORS AND METHODS FOR DEPOSITING MATERIALS ONTO MICRO-DEVICE WORKPIECES**

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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 185 days.

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(57) **ABSTRACT**

(52) **U.S. Cl.** **118/715**; 156/345.29; 156/345.33; 156/345.34

Reactors having gas distributors for depositing materials onto micro-device workpieces, systems that include such reactors, and methods for depositing materials onto micro-device workpieces are disclosed herein. In one embodiment, a reactor for depositing material on a micro-device workpiece includes a reaction chamber and a gas distributor in the reaction chamber. The gas distributor includes a first gas conduit having a first injector and a second gas conduit having a second injector. The first injector projects a first gas flow along a first vector and the second injector projects a second gas flow along a second vector that intersects the first vector in an external mixing zone facing the workpiece. In another embodiment, the mixing zone is an external mixing recess on a surface of the gas distributor that faces the workpiece.

(58) **Field of Search** 118/715; 156/345.29; 156/345.33, 345.34

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54 Claims, 6 Drawing Sheets

