

ABSTRACT

5 The present invention is to a chemical vapor deposition process for depositing a substantially planar, highly reflective layer on a substrate 20, and is particularly useful for filling high aspect ratio holes 22 in the substrate 20 with metal-containing material. The substrate 20 is placed in a process zone 95, and successive seeding and oriented crystal growth stages are performed on the substrate. In the seeding stage, the substrate 20 is heated to temperatures T_s within a first lower range of temperatures ΔT_s , and a seeding gas is introduced into the process zone 95. The seeding gas deposits a substantially continuous, non-granular, and planar seeding layer 30 on the substrate 20. Thereafter, in an oriented crystal growth stage, the substrate 20 is maintained at deposition temperatures T_d within a second higher range of temperatures ΔT_d , and deposition gas is introduced into the process zone 95. The deposition gas forms an oriented crystal growth layer 32 on the seeding layer 30, the oriented crystal growth layer having a highly reflective surface that results from highly oriented, relatively large crystals that grow on the seeding layer.

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