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Growth of MgB_2 Films by an Impinging Jet HPCVD Reactor Design DANIEL LAMBORN, Department of Chemical Engineering, Penn State University, University Park, PA, USA, R.H.T. WILKE, QI LI, Department of Physics, Penn State University, University Park, PA, USA, XIAOXING XI[1], D.W. SNYDER, SHUFANG WANG, JOAN REDWING[2], Department of Materials Science and Engineering, Penn State University, University Park, PA, USA — An impinging jet hybrid physical-chemical vapor deposition (HPCVD) reactor design was used for the growth of both thin and thick MgB2 films. This technique was able to independently control the substrate and Mg supply temperatures, and still maintained sufficient Mg overpressure to ensure phase stability. Thin films were predominantly axis oriented with the (0001) sapphire substrate while the thick films were either polycrystalline or showed preferred orientation. Thick films ($\sim$10 μm) were deposited at a growth rate of $\sim$ 110 μm/hr and showed a maximum Tc of 39.8 K and residual resistivity ratio of 6.6. The thick films also showed a high J_c of 2x10^6 A/cm^2 at low applied magnetic fields even at 20 K. The results indicate that the impinging jet HPCVD configuration shows promise for coated conductor processes.

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