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Thickness dependence of the properties of MgB_2 films grown by hybrid physical-chemical vapor deposition ALEXEJ POGREBNYAKOV, Department of Physics and Department of Materials Science and Engineering, The Pennsylvania State University, ARSEN SOUKIASSIAN, JOAN REDWING, Department of Materials Science and Engineering, The Pennsylvania State University, XIAOXING XI, Department of Physics and Department of Materials Science and Engineering, The Pennsylvania State University — Properties of pure MgB_2 films of different thicknesses (up to $\sim$1 μm) grown by hybrid-physical-chemical vapor deposition on sapphire substrates were studied. In accordance with the previous results for the films with thicknesses up to about 400 nm, T_c of the films on Al_2O_3 levels off at a value of 40.0 - 40.5 K at thicknesses larger than 200 nm. The residual resistivity, ρ_0, monotonically decreases with thickness, which is caused by a reduction of the surface and interface scattering (size effect on resistivity). For films with thickness over $\sim$ 800 nm, ρ_0 is below 0.15 $\mu\Omega$.cm and $RRR > 60$. X-ray studies of the films did not reveal any other phases besides MgB_2. In this talk, MgB_2 films of even larger thickness and the thickness dependence of critical current density will also be reported.

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