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Transport of thin superconducting films and multilayer heterostructure made by Atomic layer deposition THOMAS PROSLIER, JEFFREY KLUG, NICKOLAS GROLL, Argonne National Laboratory, NICHOLAS BECKER, Illinois Institute of Technology, ANDREAS GLATZ, VALERII VINOKUR, MICHAEL PELLIN, Argonne National Laboratory, TATYANA BATURINA, Institute of Semiconductor Physics, JEFFREY ELAM, Argonne National Laboratory, JOHN ZASADZSINKI, Illinois Institute of Technology — We report the use of atomic layer deposition (ALD) to synthesize thin superconducting films and multilayer superconductor-insulator (S-I) heterostructures. The ALD technique applied to superconducting films opens the way for a variety of applications, including improving the performance and decreasing the cost of high energy particle accelerators, superconducting wires for energy storage, and bolometers for radiation detection. Furthermore, the atomic-scale thickness control afforded by ALD enables the study of superconductivity and associated phenomena in homogeneous layers in the ultra-thin film limit. In this respect, we will present results of ALD-grown transition metal-based superconductors, including nitrides, carbides, and silicides of niobium, nitrides of molybdenum and titanium, and $Nb_{1-x}Ti_xN$/AlN-based S-I heterostructures. Transport measurement for various composition and film thicknesses will be presented.

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