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FeSe_{0.5}Te_{0.5} thin films with critical current density above 1MA/cm² WEIDONG SI, SU JUNG HAN, IVO DIMITROV, QIANG LI, Brookhaven National Laboratory — High quality FeSe_{0.5}Te_{0.5} thin films have been prepared on various substrates, such as SrTiO₃, LaAlO₃ and YSZ, some with buffer layers. T_c 's as high as 20K with superconducting transition widths of about 1K were obtained. These T_c 's are much higher than those of bulk FeSe_{0.5}Te_{0.5} (~ 15 K). Our films carry high critical current densities J_c 's (above 1MA/cm²) at liquid helium temperature. These films hold J_c 's above 1×10^5 A/cm² and very low J_c anisotropies (< 3) under magnetic fields as high as 30T at 4.2K. We have also prepared textured FeSe_{0.5}Te_{0.5} thin films on a buffered metal template with results similar to the ones mentioned above. This shows that iron chalcogenides have a very promising future for high-field applications at liquid helium temperatures. Pinning force analysis indicates the presence of a point defect flux-pinning mechanism, suggesting a straightforward approach to conductor optimization.

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