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Resistivity and superfluid density measurements on under- and over-doped $La_{2-x}Sr_xCuO_4$ films. THOMAS LEMBERGER, IULIAN HETEL, The Ohio State University, A. TSUKADA, MICHIO NAITO, Tokyo University of Agriculture and Technology — We have measured the resistivities and superfluid densities (or, penetration depths, λ) of a series of LSCO films with a wide range of Sr concentrations. Films are grown by MBE on $LaSrAlO_3$ substrates under nominally identical conditions. Due to substrate mismatch, films are under compression. Resistivities decrease smoothly as Sr concentration increases, and resistive transitions are sharp. T_c has a maximum at x = 0.15, while superfluid density $1/\lambda^2(0)$ has a maximum at x $\approx$ 0.18. Interesting features in the T-dependence of $1/\lambda^2$ will be discussed. Absolute values of resistivity and superfluid density in these films indicates quality comparable to bulk materials. Falloff of superfluid density with overdoping, together with a smooth decrease in resistivity, is consistent with an interpretation in terms of a mesoscopically inhomogeneous superconducting state.

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