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Electronic phase diagram of electron-doped cuprate $La_{2-x}Ce_xCuO_4$ explored by electrolyte gating HIDEKI MATSUOKA, MASAKI NAKANO, MASAKI UCHIDA, The University of Tokyo, MASASHI KAWASAKI, YOSHIHIRO IWASA, The University of Tokyo, RIKEN — The electrolyte gating technique, which utilizes an electrolyte as a gate dielectric layer of the field-effect transistor, enables us to control a large number of carriers in materials by external voltages. Another advantage of this technique is that it enables stable and quasi-continuous tuning of carrier density in one sample without changing any other parameters, providing a very powerful tool for constructing an electronic phase diagram of a wide variety of materials. We applied this technique to $La_{2-x}Ce_xCuO_4$, one of electron-doped cuprate superconductors, and realized gate-induced insulator-to-superconductor transitions. In the presentation, we will mainly discuss evolution of electronic states while changing carrier density, in particular by focusing in the underdoped regime.

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