The contents of this study is the investigation of model catalyst CeO2/Cu(111) by STM. The aim of the work is identifying the growth mode of CeO2/Cu(111), studying the surface morphology dependence on substrate temperature during the sample preparation and determination of the atomic structure of the prepared layers. In terms of evolution of substrate temperature during the deposition samples has been prepared by three different methods – a constant temperature, variable temperature, and annealing the sample after deposition. The growth mode of the layers CeO2 has been determined as 3D growth. Samples with different morphology have been prepared by varying temperature of substrate during the preparation. With decreasing sample preparation temperature the roughness and defect density on surface have been increasing. The best epitaxy has been achieved by temperature gradient preparation. Samples which have been prepared with temperature above 400°C have been partially covered by layer CeO2(100). Measurements with hight resolution have been performed on the samples with low coverage. The first three monolayers of CeO2 have shown a moir pattern which has been caused by mismatch in lattice parameters. Atomic resolution has been achieved only in the first and the second monolayer CeO2. The absence of defects in the arrangement of atoms in the second layer has showed a rapid adaptation of prepared layers to CeO2/Cu (111)interface. Rapid adaptation has confirmed the prerequisites of system CeO2/Cu(111) for good epitaxy.