

Next Generation Transparent Conductive Films Made with Titanium Oxide

Staff : Prof. Yuji Matsumoto (022-795-7266, y-matsumoto@tohoku.ac.jp)

Assoc. Prof. Shingo Maruyama (022-795-7267, maruyama-s@tohoku.ac.jp)

Assist. Prof. Kenichi Kaminaga (022-795-7267, kenichi.kaminaga.d6@tohoku.ac.jp)

Dept. of Appl. Chem., Chem. Eng. and Biomol. Eng.

A transparent conductive film is a thin film that is transparent yet capable of conducting electricity. Ordinary metals lack transparency, while optical thin films, which transmit visible light, are insulators. Therefore, materials that combine both transparency and conductivity are especially valuable. Among these, indium tin oxide (ITO) boasts high conductivity and transmittance and is widely used for displays in smartphones and other devices, but there are concerns about the depletion of indium resources. For this reason, niobium-doped titanium dioxide (Nb:TiO_2), which does not use a rare metal, has recently been attracting attention as a next-generation transparent conductive film. In this program, Nb:TiO_2 thin films are fabricated using vacuum deposition technology. Through band theory calculations, structural analysis, and evaluation of the properties of the thin film, you will experience the cutting edge of manufacturing that supports the modern semiconductor industry.