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Surface treatment of dye-sensitized solar cell using dielectric barrier discharge RYO ONO, SHUNGO ZEN, YOSHIYUKI TERAMOTO, KEISUKE HANAWA, SOICHI KOBAYASHI, TETSUJI ODA, The University of Tokyo — We have developed surface treatment of dye-sensitized solar cell (DSSC) using dielectric barrier discharge (DBD). The DSSC consists of TiO_2 nanoporous photoelectrode sensitized with dye. The photoelectrode is a 10-μm thick film made by sintering TiO_2 paste on a conductive glass substrate at 450 C. After the sintering, the TiO_2 film is dipped into dye solution for sensitization. The DBD treatment is applied to the TiO_2 film after the sintering. The DBD treatment improves the energy conversion efficiency, η, by a factor of 1.05 to 1.15 depending on humidity and O_2 concentration. It can be deduced that radicals such as O, O_3, and OH contribute to the DBD treatment. The DBD treatment also has an effect of reducing the sintering temperature of TiO_2 paste. If the TiO_2 paste is sintered at much lower than 450 C (i.e. $\leq$ 300 C), a solar cell cannot be produced, that is, $\eta = 0\%$. However, if the DBD treatment is applied after the low temperature sintering, a solar cell can be produced. This is important because the low-temperature sintering enables us to use materials that cannot resist high temperature. The DBD treatment is also applied to a plastic substrate DSSC. But the DBD causes damage on the TiO_2 film and at present it is not suceeded.

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