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Oxygen sensitivity of zinc oxide nanoparticles produced via laser-ablated plasma in pressurized liquid TAKU GOTO, Osaka University, YOSHIKI SHIMIZU, National Institute of Advanced Industrial Science and Technology, TSUYOHITO ITO, Osaka University — While traditional semiconductor oxygen sensor operate only with elevated temperature ($\gtrsim$ 700 K), the room-temperature operation of the ZnO oxygen sensors have been demonstrated with the help of UV light irradiation. Especially, ZnO nanotubes and nanoparticles have attracted much attentions as highly sensitive oxygen sensors and photodetectors. To the best of our knowledge, the reported works of gas sensors with ZnO nanostructures have been mostly intended for revealing effects of the morphology/shape and the size of the nanostructures. For further improvements of the ZnO-based gas sensors, it is probably required to understand effects of microscopic structures, such as densities of various defects. In this study, we synthesized the ZnO nanoparticles with various defects by means of laser-ablated plasma in pressurized water-ethanol mixture. The results indicate that the defects in ZnO affect oxygen sensitivity, and especially VO+ defects seem to be mostly responsible for the resistance change of ZnO nanoparticles. We demonstrate that partial oxygen pressure can be measured with high sensitivity.

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