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# Fracture Behavior of Metal Oxide/Silver Nanowire Composite Electrodes under Cyclic Bending

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## Abstract

The mechanical responses under cyclic bending of Ag nanowire composite electrodes coated with various metal oxide films of different thicknesses were explored, in an attempt to evaluate their applicability to flexible transparent electrodes. Al<sub>2</sub>O<sub>3</sub>, HfO<sub>2</sub>, and TiO<sub>2</sub> films were deposited onto Ag nanowire electrodes by atomic layer deposition at a low temperature of 100 °C, and cyclic bending tests with in situ resistance measurements were conducted for up to 300,000 cycles. Thicker metal oxide films resulted in greater increases in the resistances of the composite electrodes under cyclic bending due to the reduced fracture strength of the films. Regardless of the type of metal oxide, however, similar tendencies were observed in the resistance changes in response to cyclic bending. It was found that the critical thickness

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