

Characterization of oxide layer formation on the surface of small aluminum particles

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Aluminum becomes one of the most promising electrode materials because of low work function and high conductivity as well as low cost. Currently, it is used as a rear electrode of solar cell which is composed of micro-sized aluminum. In order to reduce the cost of solar cell electrode production, this electrode should be printed, for which, however, sub-micro or nano-sized aluminum particles are required.

Unfortunately, aluminum reacts with oxygen and generates aluminum oxide, which have a detrimental effect on the electrical property of electrode, because of big differences in melting point and resistivity between aluminum and aluminum oxide. As the size of particles is smaller, this issue becomes more serious due to increased volume ratio of aluminum oxide to aluminum in a particle. In this presentation, aluminum particles of various diameters are synthesized by controlling reaction temperature of a wet process. Thickness of oxide layer and its effects are quantitatively discussed. Some new ways of preventing oxidation are proposed.