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**Mechanical behavior of nanostructured and ultra-fine grained Al
containing nanoscale oxide particles processed via spark plasma sintering
of nano-sized Al powders**

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Abstract

This paper reports a study on mechanical behavior during tensile testing of nanostructured (NS) Al and ultra-fine grained (UFG) Al containing nanoscale oxide particles that were produced via consolidation of nano-sized Al powders using spark plasma sintering (SPS) only and SPS plus extrusion, respectively. Our results show that the NS Al exhibits ~370 MPa in 0.2% offset yield strength and ~0.9% in elongation to failure, whereas the UFG Al presents ~430 MPa in 0.2% offset yield strength and ~1.5% and ~1.9% in uniform elongation and elongation to failure, respectively. Based on the tensile stress vs. strain curves, microstructural features and fractured surface characteristics, mechanical behavior of NS Al and UFG Al was analyzed and discussed in detail. We suggest that the lower yield strength and ductility in the NS Al than those in UFG Al can be attributed to the strong stress

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