A spark plasma sintering (SPS) technique has been applied to prepare fully dense Al samples from Al powder. By applying a sintering temperature of 600°C and a loading pressure of 50MPa, fully recrystallized samples of nearly 100% density with average grain sizes of 5.2μm, 1.3μm and 0.8μm have been successfully prepared using a sintering time of less than 30min and without the need for a nitrogen atmosphere. A similarity between the grain size and powder particle size is found, which suggests a potential application of the SPS technique to prepare samples with a variety of grain sizes by tailoring the initial powder particle size. The SPS samples show higher strength than Al samples with an identical grain size prepared using thermo-mechanical processing, and a better strength-ductility combination, with the 1.3μm grain size sample showing a yield strength (σ0.2%) of 140MPa and a uniform elongation of more than 10%. This higher strength is related to the presence of oxide particles in the grain boundaries of the samples. It is concluded that SPS is an excellent technique for the production of very fine grained Al materials with high strength, by combining both grain boundary and oxide dispersion strengthening. © 2013 Elsevier Ltd.