Abstract Submitted
for the GEC15 Meeting of
The American Physical Society

Synthesis of Amorphous Alloy Nanoparticles by Thermal Plasma Jet in a Quenching Tube SOOSEOK CHOI, Jeju National University, DONGWHA PARK, Inha University — Recently, amorphous alloy nanoparticles have received a great attention in various applications such as catalysts, compact and highly efficient transformers, electrode material for Li-ion batteries, etc. Several methods such as microwave heating, laser ablation, and sonification have been studied to synthesize amorphous metal nanoparticles. In the present work, a high velocity thermal plasma jet generated by an arc plasma torch was used to produce iron alloy nanoparticles from an amorphous raw material which was a spherical shaped powder with the mean size of 25 μm. In order to synthesize amorphous alloy nanoparticles, a quenching tube where cooling gas was injected in different axial positions. Alloy nanoparticles were produced in a relatively high input power of higher than 10 kW in a fixed powder feeding at 300 mg/min. The crystallinity of synthesized nanoparticles was decreased with increasing the quenching gas flow rate. The amorphous alloy nanoparticles were found when the quenching gas injection position was 200 mm away from the exit of the plasma torch with the highest quenching gas flow rate of 20 L/min. In the numerical analysis, the highest quenching rate was also expected at the same condition.

Sooseok Choi
Jeju National University

Date submitted: 18 Jun 2015 Electronic form version 1.4