Properties of High Pressure Inductively-Coupled Plasmas for Modification of Nano-Particles

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Functional oxide ceramics are expected to be employed for applications to gas sensors and catalysts. Especially, ceramics nano-particles often have structural and functional properties which are attributed to the small grain size. Particularly, nano-composites including ceramics nano-particles attract increasing interests as promising materials for various applications such as fuel cells, mass storage media and optical information devices. For the purpose of fabrication of high quality nano-composites, phase structure and surface conditions of nano-particles must be controlled. However nano-particles processing involves following problems to be overcome; 1) aggregation due to intermolecular force and 2) sintering and formation of compound oxides easily occurred by conventional thermal treatments.

In this paper, we have developed nano-particle modification techniques in gas phase by high pressure inductively-coupled plasma. As an example, dependence of discharge mode in Ne+Ar(0.1%) mixture gas on RF power and pressure in our plasma processing equipment is shown in Fig.1. In this presentation, we will report the experimental results regarding the condition of plasma and the nano-particle modification.

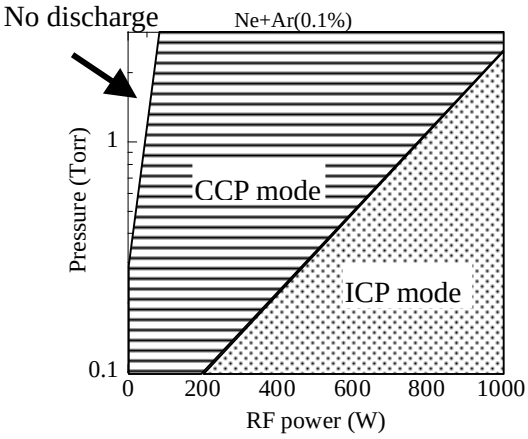

Fig.1. Discharge mode dependence on RF power and pressure