

# Experimental Studies on Size Effect of Nanoparticle

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Various size particles of Se and Te that were produced by the AGEM method were put on the Sb thin film. Diffusion of Sb atom predominantly took place in the case of the Sb-Te system. In the Sb-Se system, the diffusion direction of Se atoms changed with the particle size. These differences were discussed on the bases of the particle stability and electronegativity.

By using simultaneous evaporation of SiO and metal, clusters covered with SiO have been produced. In addition to the A-15 type structure of Cr and Fe clusters with the size of a few nm, particles of singular morphology due to the growth mechanism of VLS was found in the particle growth process in the rising smoke. The singular particles were composed of spherical silicide ( $\text{CrSi}_2$  or  $\text{FeSi}_2$ ) with Si tail. The surface of singular particle was covered with thin amorphous  $\text{SiO}_2$  layer.

A simple method to change the feature of smoke was proposed. The smoke particles by this method became a half size than those of ordinarily produced smoke particles of Al and  $\text{In}_2\text{O}_3$ . It was found that the oxide smoke curved in an electric field. Truncated  $\text{In}_2\text{O}_3$  tetrahedron particles (TTP) less than 100nm in size were predominantly obtained. The stable new oxygen defect positions in the TTP were determined.

It was also found that smoke particles of different crystal structure could be separated by the use of electric field. Red-PbO particles flowed towards the negative plate and yellow-PbO particles flowed towards the positive plate, i. e. two different structures were separated.  $\text{SnO}$  and  $\text{SnO}_2$  particles could be separated by the use of electric field as well as lead oxide. The curve of the smoke was discussed as that the surface net charge was affected by the electric field.