# Chemistry in protoplanetary disks: effect of dust evolution

*Kenji Furuya[1]

1. Center for Computer Sciences, University of Tsukuba

There is growing observational evidence that the spatial distributions of gas and dust grains are different in protoplanetary disks; the gaseous component of disks, probed by CO emission line, is more extend compared to the dust components, probed by (sub)mm dust continuum. This has been often interpreted as the consequence of growth and radial drift of dust grains from outer to inner regions of disks. The dust evolution would affect disk chemical composition significantly. It is thought that significant fraction of heavy elements, such as carbon and oxygen, is present as ices, covering grain surfaces, in cold (<100 K) outer regions of disks. The radial drift of ice-coated dust grains would transport the heavy elements locked up in ices from outer to inner regions, leading to the depletion of the heavy elements in the outer disks and the enhancement of the heavy elements in the inner disks. Indeed, recent ALMA observations have suggested spatially non-uniform carbon elemental abundance in some disks.

In this presentation, I will present our new model that considers both dynamical and chemical evolution in disks. The model includes viscous evolution of gas, growth and radial drift of dust grains, and gas-ice chemistry in a time-dependent manner. I will discuss how growth and radial drift of icy dust grains affects elemental abundances and molecular compositions in disks. In particular, I will show that the CO abundance profile in the disk midplane is not simply set by the balance between adsorption and desorption, but is shaped by the combination of gas-ice chemistry and dust evolution.

Keywords: Protoplanetary disk, Dust evolution, Gas-ice chemistry

 