

## Award

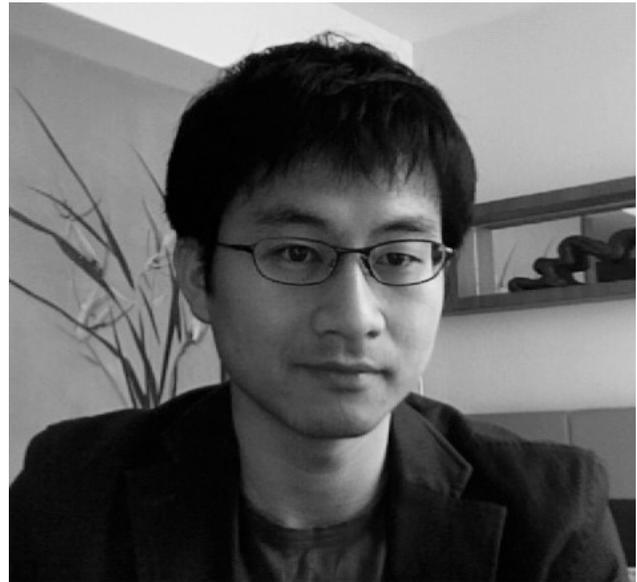
### 2008 Nier Prize for Shogo Tachibana

In each generation, there are people of extraordinary talent who are able to see farther than the rest of us. I have been extremely fortunate to know and work with one of these people, Shogo Tachibana, the recipient of the 2008 Nier Prize. I first met Shogo at the Chicago Meteoritical Society Meeting in 2000. Hiroko Nagahara approached me and asked if I would be interested in having a bright young Japanese scientist as a Post Doc in my laboratory. I was initially cautious because I did not have money to hire a Post Doc. But after assurances that this person would come with his own money, my interest increased significantly. She then introduced me to a young man of slight build, but with quiet confidence, who proceeded to convince me that it would be very much in my interest to have him come to Arizona State University as my Post Doc. Shogo arrived in Arizona with his wife, Kaoru, in April of 2001, and during the following two years, we had an extremely productive and interesting time studying a variety of topics related to cosmochemistry.

Shogo received his B.Sc., M.Sc., and Ph.D. degrees from Osaka University, graduating in March 2000. He then won a prestigious Research Fellowship of the Japan Society for the Promotion of Science. He spent the first year of this fellowship at the University of Tokyo before moving to Arizona State University for the next two years. In March of 2003, he began his current faculty position in the Department of Earth and Planetary Science at the University of Tokyo, the flagship research university in Japan.

Shogo Tachibana has a wide range of talents, and the breadth and depth of his research record are truly remarkable. **Experimental petrology:** Beginning as a student of Akira Tsuchiyama, Shogo has studied mechanisms and rates of evaporation of troilite and enstatite under solar nebular conditions. These minerals evaporate incongruently and may be responsible for chemical fractionation of Mg/Si and Fe/S (Tachibana and Tsuchiyama 1998; Tachibana et al. 2002a). He has also investigated the details of isotopic fractionation of Fe and Mg during evaporation from metal and forsterite. This work resulted in a more complete theoretical description of the evaporation process. Iron fractionates as expected from the kinetic theory of gases, but Mg does not, probably due to differences in bonding of surface atoms and evaporating adsorbed atoms between metallic Fe and forsterite (Tachibana et al. 2002b, 2006a, 2007).

**Cosmochemistry:** Shogo is the lead author of the paper that first suggested a correlation between chondrule chemistry and



Shogo Tachibana.

$^{26}\text{Al}$  age (Tachibana et al. 2003a). He designed and carried out a study of mass fractionation of S in primary troilite within chondrules and showed how the lack of isotopic fractionation provides a constraint on the heating history of chondrules (Tachibana and Huss 2005).

**Iron-60 and the origin of short-lived radionuclides:** The most high-profile of Shogo's contributions is his search for and discovery of clear evidence for  $^{60}\text{Fe}$  in sulfides from primitive ordinary chondrites (Tachibana and Huss 2003). Based on a brief conversation about my unsuccessful previous attempts to find  $^{60}\text{Fe}$  in chondritic material, he devised a plan to search for  $^{60}\text{Fe}$  and selected the samples. He presented the idea to me just before I headed off to teach field camp in the summer of 2002, and by the time I returned, he had the first data showing clear evidence of  $^{60}\text{Fe}$  in troilite. This discovery has changed the discussion about short-lived nuclides in the early solar system in a fundamental way. Additional work has extended the observations to chondrules (Tachibana et al. 2006b). Recently, Shogo surprised me again with results of some model calculations that appear to solve one of the major problems in understanding how a supernova could have provided short-lived nuclides to the early solar system. The calculations, which were designed originally as a class project for his undergraduate students, showed how supernova explosions of

stars ranging from 25 to 40 solar masses could have produced  $^{26}\text{Al}$ ,  $^{41}\text{Ca}$ ,  $^{60}\text{Fe}$ ,  $^{53}\text{Mn}$  in the relative abundances inferred for the early solar system through a combination of mixing between zones during the explosion and partial fallback of the mixed material onto the remnant. A subset of observed supernovae, called faint supernovae, appears to behave in the required way. Shogo's students presented this work at the 2007 LPSC, and a paper is in press in *The Astrophysical Journal* (Takigawa et al. 2008).

**Astromineralogy:** Shogo and his students are working on determining the optical constants that can help astronomers measure not only the mineral species but also the shape of mineral grains in space. Their studies have shown that anisotropic evaporation/condensation due to differences in kinetics produces observable differences in the response in the infrared, potentially providing a probe of the physico-chemical conditions in dust-forming regions (Takigawa et al. 2007).

**Mass-independent fractionation of S in the early Earth:** To investigate the oxidation state of the Earth's atmosphere, Shogo collected and measured samples of  $\sim 3$  Ga and  $\sim 2.3$  Ga old sulfides and found evidence of mass-independent fractionation, a signal of an anoxic atmosphere. These are the youngest samples to show these effects (paper in preparation).

On the personal side, Shogo is a joy to work with. He is a fast study, mastering the ion probe more quickly than anyone I have ever seen. He quickly sees to the heart of any problem, and I always learn a great deal from interactions with him. Shogo is a baseball fan. In fact, baseball may be the real reason he wanted to come to Arizona (spring training). He loves ice-cream, and because of easy access to ice-cream in Arizona, gained quite a bit of weight while he was there. He and Kaoru have a beautiful daughter, Hinako, to carry forward the legacy of this extraordinary scientist.

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