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# Award

# 2004 Nier Prize for Scott R. Messenger

After receiving a bachelor's degree from the University of Washington (Seattle), in 1991, Scott Messenger arrived as a physics graduate student at Washington University in St. Louis, ultimately to be the last Ph.D. student of Professor Robert M. Walker. Pioneering work by Kevin McKeegan and Frank Stadermann had previously shown that many interplanetary dust particles (IDPs) have large deuterium and $^{15}N$ excesses, relative to the Earth, and that, in some cases, the D is concentrated in tiny (1 $\mu m^2$) areas. While at the Washington University, Scott extended this work to systematically show that D and $^{15}N$ excesses are more prevalent and reach higher values in the so called cluster IDPs (large particles that break apart on NASA's IDP collectors), compared to individual IDPs. Moreover, in at least one case, the observed D/H ratio of an IDP reached values observed by astronomers in certain organic molecules in interstellar space. This work, published in *Nature* (Messenger 2000), showed that almost-pure presolar molecular cloud material is preserved in some IDPS and that these tiny particles can be used as laboratory probes of interstellar chemistry. Being at Washington University in the 1990s, Scott, unsurprisingly, also got involved in studies of meteoritic stardust. In collaboration with Simon Clemett and Richard Zare at Stanford University, Scott showed that presolar graphite grains from meteorites contain polycyclic aromatic hydrocarbons (PAHs) and in several cases, the C isotopic composition of the PAHs matches that of the bulk grain (Messenger et al. 1998). These observations have important implications for circumstellar and interstellar chemistry. After receiving his doctorate in 1997, Scott spent two years at the National Institute for Standards and Technology developing isotopic ratio measurement techniques using ToF-SIMS before returning to Washington University as a senior research scientist. His return coincided with the arrival of a new generation ion microprobe, the Cameca NanoSIMS. Scott quickly exploited the high spatial resolution and sensitivity of the NanoSIMS to undertake a search for presolar grains in IDPs. Remarkably, one of the first particles he studied contained a sub-micron silicate grain highly enriched in $^{17}O$. This and the subsequent discovery of several more presolar silicate grains were published in *Science* (Messenger et al. 2003). This work showed that the abundance of presolar grains in IDPs is several orders of magnitude higher than in the most primitive meteorites. Moreover, it opened up the study of presolar grains to the astrophysically typical silicate phases. In 2003, Scott moved

to Houston to be a staff scientist at NASA's Johnson Space Center, where he is eagerly awaiting the arrival of a next-generation NanoSIMS, sure to result in many exciting discoveries.

Scott has been a pioneer in the development of laboratory techniques enabling combined chemical and isotopic analysis of the same tiny (but extremely interesting) extraterrestrial materials. In his short career, he has made several fundamental contributions to the study of presolar materials in interplanetary dust and meteorites. In addition, Scott's graduate student tenure at Washington University coincided with my own and he has been a great personal friend and scientific collaborator for many years. Mr. President, it is with great pleasure that I present to you Dr. Scott R. Messenger for the 2004 Nier Prize of the Meteoritical Society.

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