

AEROGEL CAPTURES COMETARY AND INTERSTELLAR SAMPLE via STARDUST

The last paper for the 4th Aerogel Symposium was titled - "Silica Aerogel Captures Cosmic Dust Intact". This exciting dream is realized in a NASA 4th Discovery Mission - STARDUST. STARDUST launches on February 6, 1999, encounters comet Wild-2 on January 1, 2004 and returns to Earth on January 13, 2006. Aerogel is the primary instrument to capture both cometary and interstellar samples. Comets are the best preserved samples of the initial solar nebula. Detail laboratory analysis of the samples will provide understanding of the formation and subsequent process of our solar system.

Aerogel has proven to be the best hypervelocity intact capture medium in space. The low density renders low initial impact shock pressure to better preserve fragile particles. The wide density range allows broad dynamic capture capacity in particle sizes. The high surface area allows the efficient entrapment of volatiles. Metallic oxides aerogel can withstand space environment: thermal cycling, radiation and ionic erosion. Being transparent, identifying small particles is made immensely easier.

The STARDUST mission is briefly described. The aerogel collector and the sampling instrument is presented. The practical compromises in the design of the flight collector are contrasted with the proposed goals. The flight qualification process of aerogel for space flight is delineated. The expected science return in both the cometary samples and interstellar sample is explained.