MINERALOGICAL AND MORPHOLOGICAL PROPERTIES OF DUST IN THE LOCAL INTERSTELLAR CLOUD.

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Introduction: The solar system is currently immersed in a parsec-scale cloud, which is referred to as the Local Interstellar Cloud (LIC) [1]. While the majority of the LIC is partially ionized hydrogen atoms, the dust comprises 1% of the total mass of the LIC [2]. The mineralogical and morphological properties of the LIC dust can be constrained by considering the elemental abundances of LIC dust and its dynamics in the solar system. In this paper, we summarize our best knowledge of the dust properties.

Elemental Abundance Arguments: The gas-phase abundances of major dust-forming elements are calculated from their column densities through the LIC measured by Hubble Space Telescope. Once the total LIC composition is assumed to be solar, the dust-phase elemental abundances can be derived from the gas-phase abundances and the solar photospheric abundances [2].

Dynamical Arguments: In-situ data on the mass and velocity of LIC dust in the solar system measured by Ulysses are used to estimate the ratio ß of solar radiation pressure to solar gravity acting on the dust. Numerical calculations of the ß ratio give insight into the properties of LIC dust [3].

Summary: Because of the similarity between Mg-normalized elemental abundances of LIC dust and those of solar system dust, we may infer the composition of dust in the LIC from available information on the composition of solar system dust. We suggest a model of LIC dust to consist of magnesium-rich pyroxenes, iron-sulfides, metals, spinels, and organic refractory. Then the mass ratio of organic refractory to silicate is approximately unity. The ß ratio of LIC dust is consistent with an aggregate of submicron-sized grains that have a structure of a silicate core and an organic refractory mantle.

References: [1] Bertin P. et al. (1993) *JGR, 98,* 15193. [2] Kimura H., Mann I., and Jessberger E. K. (2003) *ApJ, 582,* 846–858. [3] Kimura H., Mann I., and Jessberger E. K. (2003) *ApJ, 583,* 314–321.