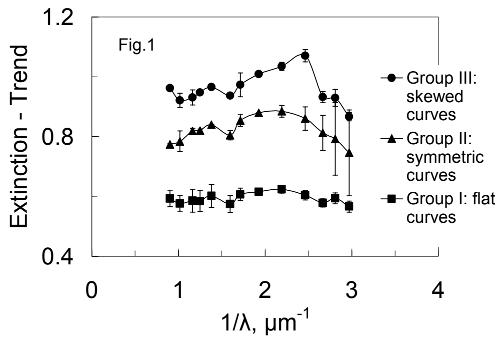
INTERSTELLAR DUST AND SOLAR SYSTEM OBJECTS: ASTEROIDS AND METEORITES.
D. I. Shestopalov and P. N. Shustarev, Shemakha Astrophysical Observatory, Shemakha, Azerbaijan, AZ-3243 (shestopalov_d@mail.ru).

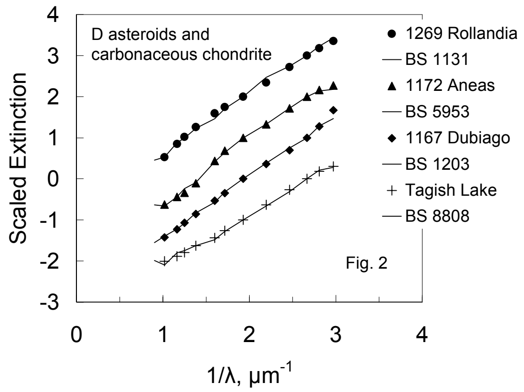
Introduction: In accordance with modern conceptions, asteroids are residues of protoplanetary nebula solid material, which terrestrial planets, planet satellites, and giant planet cores have arisen from. The gas-and-dust nebular itself was typical structure of interstellar medium. We make an attempt to find within the bounds of Solar System a material that has spectral properties like interstellar dust. Thus asteroids, meteorites, cometary nuclei, and interplanetary dust are the objects of our interest. Here we not go beyond asteroids and meteorites

Interstellar Dust: Based on colorimetric observations of Bright Stars [1], situated in the range of 1000 ps around the Sun, selective extinction of light by interstellar dust in the range of 0.3 – 1.1 μm was studied. About 40 interstellar extinction curves were calculated from the colors of reddened stars and their unreddened analogs. Interstellar extinction is usually believed to increase proportionally to wave number λ^{-1} in the above-stated wavelength range. Nevertheless, one can arrange the observed extincttion curves in accordance with their form in three groups. Figure 1 shows typical extinction curves relatively to linear trend, which approximates so called "law of λ^{-1}". The differences in the form of the interstellar extinction curves appear to be due to the differences in the dust particle compositions.



Solar System Objects: A theory of light scattering by regolith-like surface [2] allows deriving the optical constants of the surface material from its albedo spectrum. To calculate the model extinction curve which is generated by the same material concentrated in small dust particles, Mie theory in the approach of Rayleigh's particles was used. Varying free parameters, i.e. the average optical path length in the regolith particles and their average refractive index as well as the average size of the modeled dust particles, one can try to fit the model extinction curve to the observed ones.

Asteroids: When examining the asteroid spectra we used the colorimetric catalogue [3] since photometric systems of this catalog and the 13-color catalog of Bright Stars are close. The modeled extinction curves derived from the S-, A-, V-asteroid spectra are badly corresponding with the observed ones in the range of 0.7 – 1 μm. It occurs owing to the fact that spectra of these asteroids contain the mafic silicate absorption feature near 1 μm, which is not observed in the interstellar extinction curves. The reflectance spectra of E, M, C, and P asteroids are in-sufficiently red to fit successfully the calculated and observed extinction curves. Only the reddest spectra of D asteroids reproduce the extinction curves that are close to the interstellar ones. Figure 2 shows the best fit of the modeled and observed extinction curves in the range of 0.3 – 1.1 μm. Note, D asteroids 1167 Dubiago and 1269 Rollandia are situated in the outer side of the Main Belt, and 1172 Aneas is Trojan.



Meteorites: Unusual carbonaceous chondrite Tagish Lake is believed to be closely related to D-type asteroids [4]. Among the available meteorite reflectance spectra in [5] only spectrum of Tagish Lake gives the model extinction curve that is similar to the observed ones (Fig. 2). It should be noted that, the modeled curves of the meteorite and D asteroids reproduce the interstellar extinction curves called "flat" in Figure 1.

Discussion and Conclusions: The D-asteroid surface composition is unknown today. Since D asteroids are situated in remote zone of the Main Belt and in Jupiter orbit, one can suppose that D-asteroid material remained almost unaltered since Solar System origin. Similarity between the D-asteroid and cometary nucleus spectra [6] says, apparently, for presence of carbonaceous compounds on the D-asteroid surfaces. We infer from the above facts that material of interstellar dust particles appears to survive still on some D asteroids. Chondrite Tagish Lake may give a key not only to the D-asteroid composition but also to that of interstellar particles.

References: [1] Johnson H. L., Mitchell R.I. (1975) *Rev. Mex. Astron. Astrofis*., *1*,299–324. [2] Shkuratov Yu. et al. (1999) *Icarus, 137,* 235–246. [3] Zellner B et al. (1985) *Icarus, 61,* 355–416. [4] Hiroi T. (2001) *Science, 293,* 2234–2236. [5] RELAB Public Spectroscopy Database. [6] Hicks M. D. et al. (2000) *Icarus, 143,* 354–359.