Role Of Nanodiamond Dust Component In Far-UV Extinction

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Nanodiamonds are the most abundant presolar grains in primitive meteorites and could be important component of interstellar dust. Observations of 3.43 and 3.53 micron emission lines in Ae/Be Herbig stars and 3.47 micron absorption band along proto-stars suggest the presence of hydrogenated nanodiamonds in the ISM. Their formation possibilities include CVD and shock in supernovae but due to highly symmetric lattice their direct detection is difficult. Contribution of nanodiamonds towards extinction of starlight is studied using optical properties of Allende meteoritic diamond and Mie theory is applied for spherical shape of nanodiamonds. The different carbon metamorphs may coexist in Interstellar Medium (ISM) simultaneously and UV annealing may induce morphological transition of carbonaceous grains to nanodiamond-graphite core-shell structures. Pure Nanodiamond grains show negligible extinction from IR to near-UV and very sharp far-UV rise. Core-mantle model taking nanodiamond core and non-spherical mantle of different carbon metamorphs, graphite and amorphous carbon shows variations in the profile of the 217.5 nm extinction bump and sharp far-UV extinction. Separate silicate and different carbon metamorphs are considered in modelling the extinction along various stellar sightlines that show anomalous rise in far-UV extinction. The average extinction of the Galaxy and also that of LMC and SMC shows improved fit in the far-UV and reduce contribution of silicates in consonance with the ISM abundances.