RECENT ANALYSES OF ENIGMATIC FIND IN SOOKE AREA OF VANCOUVER ISLAND

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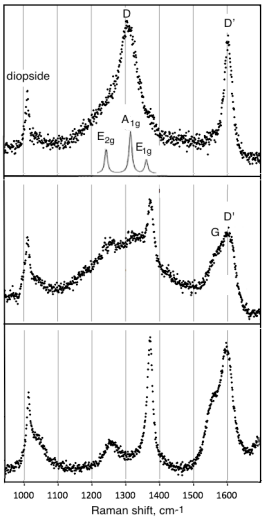
Introduction: A very intriguing 13-kg oriented stone with 70% of surface covered with black fusion crust and with some magnetic properties was discovered in Sooke Basin near Juan de Fuca Strait, in the south of Vancouver Island, British Columbia [1]. Chemical, petrological, X-ray diffraction, Raman, Mössbauer and oxygen isotopic analyses suggest that it could be an ungrouped primitive achondrite of polymict breccia type ejected from early watery Mars, some planetesimal or large asteroid [1], [2]. In particular, in the Korotev's maps of various chemical species vs. wt.% of Fe_2O_3+MgO the wt.% data for SiO_2, Al_2O_3, CaO, CaO/Al_2O_3, K_2O+Na_2O and Cr are located in the Martian achodndrite regions, and for Fe_2O_3, Fe_2O_3/MnO, K_2O, Na_2O and Ni are very close to them. The presence of lonsdaleite-diamonds [3], [4] and abundance of clinopyroxene makes this find also similar to carbonaceous ureilites and rocks found in the impact craters.

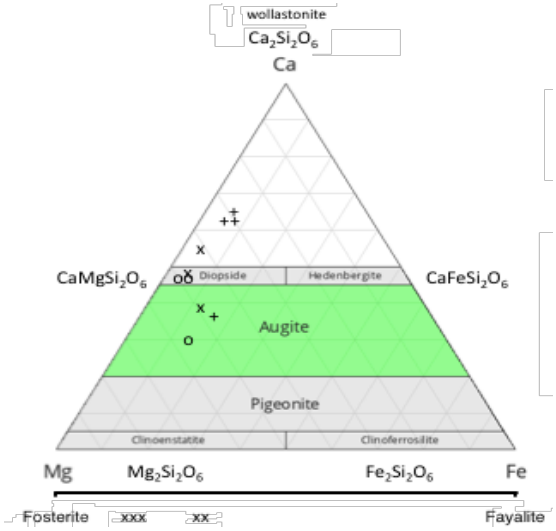
Recent Analyses: The active vibrational bands E_{2g}, A_{1g} and E_{1g} of lonsdaleite observed by us *in situ* in Raman spectra (Fig. 1) and maps of polished surface are unusually well-defined and therefore this Sooke rock can be used as very good reference material in further studies of nano-diamonds [5], [6], [7]. Comparisons with the data about thermally and shock metamorphosed carbonaceous matter [8], [9] suggest that the examined by us rock was exposed to even greater impact shock and shear than observed thus far in cosmic dust, meteorites and impact craters.

At present, after a period of limited access to analytical facilities due to lockdowns, our work is focused on electron microcopy examinations of mineral composition in the fragments of this rock and especially in its 30-μm thin sections. The analyses are being performed using Hitachi S-4800 field emission scanning electron microscope with cold field emission electron source and Bruker Quantax EDS for X-ray spectroscopy with ring-type YAG backscatter detector. After plasma cleaning, the examined samples had to be outgassed in vacuum for about 48 hours before putting into the SEM chamber. This is common in meteorites with trapped gasses in the pores of the matrix and less common in terrestrial samples. The samples did not charge in the SEM showing mostly conducting properties.

The SEM images and EDS spectra of selected areas examined confirmed the dominant presence of clinopyroxene mostly as diopside, some augite, lesser olivine-fosterite, magnetite, and iron oxides - in a form of nanoparticles npOx and their aggregates. An example of SEM mictograph and pyroxene triangle with EDS data obtained thus far in three areas of thin section (points +, x, o) and olivine compositions (x) are presented along the bar below (Fig. 2).

We are asking the meteoretical community for an advice and help in further studies of this quite unusual object.





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