Inter- and intra-specific variability of trace metals in shells of *Mytilus* sp., *Serripes* sp., and *Arctica* sp.

A. PONNURANGAM[1,2]*, A. KOSCHINSKY[1], M. BAU[1], T. BREY[2] AND J. BIJMA[2]

[1]School of Engineering and Science, Jacobs University, Bremen, Germany (*correspondence: a.ponnurangam@jacobs-university.de)

[2]Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

Bivalve shells contain within their structure a record of their past growth in the sea due to the sequential deposition of layers of mineralised material, laid down according to the organism's growth rate. For this reason, the importance of bivalve shells as proxy archives for changes in environmental conditions like ocean acidification, is increasingly recognized. However, data for trace metal concentrations in bivalve shells are quite scarce and underrepresented.

The incorporation of trace metals, including rare earth elements and yttrium (REY), as well as uranium in shells of *Mytilus* sp., *Serripes* sp. and *Arctica* sp. was investigated through bulk trace metal analysis. The chemistry of these trace metals in terms of speciation and complexation, makes them particularly useful in acting as geochemical proxies of oceanic change. We looked at the availability and variability of trace metals in shells from different locations and at the extent to which these shells reflect the ambient seawater trace metal content.

Differences in element concentrations were found within and between species. Clear-cut differences in concentrations of REY were observed between the different species of bivalves. Shells of the same species from different sampling locations were found to be enriched differently. Some shells exhibited more seawater-like signatures while others reflected signature patterns of particulate matter. Furthermore, major trace elements like uranium, also varied within species obtained from different locations. *Serripes* sp. from Svalbard were found to contain higher concentrations of uranium than those from Alaska.

Our findings demonstrate the extent of within-species spatial biomineral variability and provide hints as to how shells may or may not reflect characteristics of ambient seawater. If the incorporation of trace metals in biominerals is indeed sensitive to environmental condition, these elements may add to proxy based reconstruction of environment history.

Whether graphites is able to reflect an economical aspect of metalliferous strata

V.A.PONOMARCHUK[1,2]*, T. N. MOROZ[1], A.N. PYRYAEV[1], A.V. PONOMARCHUK[1] AND D.V. SEMENOVA[1]

[1]Institute of Geology and Mineralogy, 630090 Novosibirsk, Russia;

[2] Novosibirsk State Universitet (*correspondence: ponomar@igm.nsc.ru)

A carbon situated in numerous of Au-, Pt-, Pd-ore and other metals deposits. Carbon-metal correlation is wide discussed and contrary points of view are exist: active (metalorganic+transport) and passive (reducing environment) role of carbon. In order to understand correlation described above comparative study have ben performed. It include morphological (scanning microscopy), microelemental (synchrotron radiation –X-Ray fluorescence), isotopic composition investigations and carbon ordering degree analysis (Raman spectroscopy) of Malomyr, Suhoy Log (Russia) and Suzdal (Kazakhstan) black shale deposits. Moreover, graphites in Pt–Low_Sulfide Ores of Verhnetalnahsk intrusion have ben studied [1,2].

The main propeties of the black shale deposit graphites are moderate generation temperature (200-400°C), low degree of carbon ordering (I_{D1}/I_G – from 0.6 to 1.2) and wide range of carbon isotopic composition (generally from -18 to -28 $‰_0$). Graphites in Pt–Low_Sulfide Ores of Verhnetalnahsk intrusion characterized by nanostructured topology (Fig.), high generation temperature (450 - 750°C), high Pt content (less than 50 ppm), high degree of carbon ordering (I_{D1}/I_G – from 0.02 to 0.2) and short range of carbon isotopic composition (fron -13.5 to -15 $‰_0$). Preliminary conclusion: only nanostructured graphite is able to reflect economical characteristics of metalliferous strata.

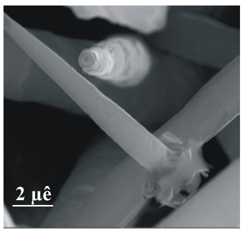

Figure. Scan-image of nanostructured graphite: "T"-joint nano- and microtubes.

[1] Ryabov, Ponomarchuk, Titov & Semenova (2012) *Doklady Earth Sci*. 446, 1193–1196; [2] Ponomarchuk V., Kolmogorov, Ryabov, Titov, Moroz, Pyryaev & Ponomarchuk A. (2013) *Bul. of the Russian Academy of Sci. Physics* **77**, 203–206.

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