# Gene expression in the deep biosphere

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Microbial community metabolism in the marine subsurface likely plays an important role in global biogeochemical cycles but deep biosphere activities are not well understood. Illumina sequencing of community messenger RNA was performed to obtain the first subseafloor metatranscriptome from anaerobic Peru Margin sediment up to 159 meters below seafloor. Metabolic reconstruction indicates anaerobic metabolism of amino acids, carbohydrates, and lipids are dominant processes, and profiles of dissimilatory sulfite reductase transcripts are consistent with sulfate concentration profiles. Moreover, cell division transcripts across all three domains of life increase where peaks in microbial abundance are observed in subseafloor sulfate-methane transition zones. These data support calculations and models of subseafloor microbial metabolism, and represent the first holistic picture of deep biosphere activities. Furthermore, an investigation of eukaryotic 18S rRNA revealed active Fungi across a range of marine subsurface provinces. Subseafloor fungal populations exhibit statistically significant correlations with total organic carbon, nitrate, sulfide, and dissolved inorganic carbon suggesting environmental selection of active Fungi in the marine subsurface.

# Raman Spectra And Microhardness Of Sphalerite Solid Solutions ZnS·FeS

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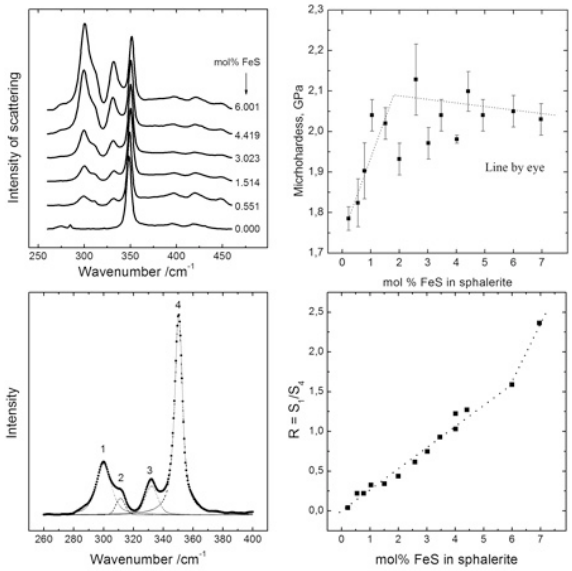
Synthesized sphalerite solid solutions ($Fe_xZn_{1-x}S$) in the range 0 <mol % FeS <50 with compositional step 5 have been studied with the use of Raman spectroscopy. The main objective of these experiments was to learn how the iron content of sphalerite affects the Raman spectra [1].

Raman intensities over the whole range of concentrations suggest a structure change in the rather narrow region of mole fractions of FeS between 0.15 and 0.25. Currently special attention was paid for compositions 0≤mol% FeS≤ 6 (15 samples, gas transport and average diameter of crystals 1 mm) where microhardnes (HV) grows extremely from 1.7 to 2.1 GPa. In this composition area additional peak 310 $cm^{-1}$ appears that might be due to cluster forming process in sphalerite lattice. The ratio of intensities of Raman lines 295 and 345 $cm^{-1}$ can be used for the compositional analysis of sphalerite.




This study was supported by Grant RFBR 13-05-00405.

[1] Osadchii E.G. and Gorbaty Y.E. (2010) *Geochim. Cosmochim. Acta* **74**, 568-573.


DOI:10.1180/minmag.2013.077.5.15