Study of local concentration of donor nitrogen in micro diamonds from Kokhcetav massif

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This work presents first EPR data on detailed analysis of P1-centers local concentration and ones on crystal volume with certain P1 content for metamorphic micro diamonds from the Kokchetav region. The object studied were micro diamonds from garnet-pyroxene and garnet-carbonates rocks. Using synthetic diamonds with high concentration of nitrogen impurity (up to 2000 ppm) grown with HTHP with added Fe_3N as references of high nitrogen concentration and using also Van Wyk's data (1998) on the calculation of local P1 content by analyzing EPR single line width we resolved the problem to determinate high local donor nitrogen concentration without measuring microcrystals weight. Measured local concentrations in different parts of microcrystals from garnet-pyroxenites are 1900 ppm and 320 ppm. P,T treatment of microcrystals from garnet-pyroxenites at 1800 ^{O}C and 60 kbar for 18 hour eliminates a broad line and EPR P1-signal of 3.5 G half width corresponding to 350 ppm was observed Analysis of the kinetics of nitrogen aggregation confirmed its initial 1900 ppm content at hopping mechanism of diffusion. Obtained local P1 contents allow to draw the following conclusions. Diamonds from carbonates were characterized by uniform distribution of P1 centres. Early IR measured 50% content of A defects pointed out to relative prolonged period of presence of these crystals at high P,T conditions. For diamonds from garnet pyroxenites observing two pronounced regions of P1 local contents seems to correspond to two stages of crystal growth. And, nitrogen aggregation process occurred to a greater extent in the interior of the crystal (A centres up to 80%) than in the exterior where nitrogen is in P1 form (up to 80%) .The higher P1 content in the interior of small-sized crystals seems to correspond to a later period of crystal formation.

Partitioning of Li, Be and B between minerals in metapelitic rocks – case studies of Ikaria Island (Greece), Künisches Gebirge (Germany), Campo Tencia (Swiss Alps)

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Secondary ion mass spectrometry (SIMS) has been used to determine the absolute concentrations of Li, Be and B in minerals from a number of metapelite samples. All rocks show a prograde metamorphic evolution and reached nearly the same peak conditions of lower amphibolite-facies.

Absolute abundances of Li, Be and B in primary phases depend on bulk rock compositions. A systematic partitioning of the three light elements between the different minerals was observed (Lithium: St > Bt > Ms > Grt > Tur > And > Pl > Ky; Beryllium: St > Pl > Ms > Bt > Tur > Grt > Ky ≈ And; Boron: Tur > Ms > Bt > And > Pl ≈ Grt > Ky > St). Some of the garnet grains exhibit systematic Li zonation patterns with a core-to-rim decrease in Li mimicing the prograde Mn patterns.

The observed inter-mineral partition coefficients for Li, Be and B suggest near-to-equilibrium conditions. In some cases, deviations or variations result from low concentrations near the detection limit. Partition coefficients for selected mineral pairs are given in the table below. Partition coefficients involving zoned garnet were calculated with rim compositions.

	Li	**Be**	**B**
$\mathbf{D_{St/Bt}}$	3.2 - 4.6	15.2 - 48.7	0.01 - 0.29
$\mathbf{D_{St/Ms}}$	25.9 - 43.3	10.8 - 18.7	0.01 - 0.04
$\mathbf{D_{St/Grt}}$	21.4 - 41.7	138 - 1922	0.05 - 1.11
$\mathbf{D_{Bt/Ms}}$	5.5 - 8.5	0.2 - 0.8	0.06 - 0.48
$\mathbf{D_{Bt/Grt}}$	4.2 - 13.8	9.2 - 34.4	0.2 - 31.2
$\mathbf{D_{Ms/Grt}}$	0.7 - 2.5	11.5 - 89.1	9.4 - 81.5