

EPR-SPECTROSCOPY OF YAKUTIAN DIAMONDS.

Mineeva R.M., Titkov S.V., Marfunin A.S., Speransky A.V.,
Bershov L.V.

Institute of Geology of Ore Deposits, Petrography, Mineralogy
and Geochemistry of RAS, Staromonetny 35, Moscow, 109017, Russia

80 diamond crystals from Yakutian kimberlite province have been studied by EPR-spectroscopy. The crystals represent different morphological and color types. Paramagnetic centers are widely distributed in Yakutian diamonds. There are nitrogen-related centers P1 (single nitrogen atom in carbon position), N1,N4,W7 (two nitrogens of different configuration), P2,W21 (three nitrogens), as well as N2 which has been earlier related to dislocations. Other paramagnetic centers are Ni-related (NE1,NE2,M1), oxygen-related (OK1), and dislocation-related centers with S=1 (A1,D1). Most abundant and of highest concentrations centers are P1,P2,N2. Maximum spin concentrations are 10^{17} spin/g in P1, 10^{18} spin/g in P2, 10^{16} spin/g in N2. Other centers are observed (with standard registration and at room temperature) only when one of the three principal centers exists.

The investigated diamonds can be divided into 5 groups: with principal P1 center, with principal P2 center, with principal N2 center, with several centers in comparable concentrations and without detectable centers. But in each of the group, specific complementary centers are present. Characteristic association of centers are observed in different crystals.

EPR-classification of diamonds may be used in attestation diamonds for different applications in electronics and techniques as well as in reconstruction of geological conditions of diamond crystallization.

References

1. Mineeva R.M., Speransky A.V., Titkov S.V., Bershov L.V. New paramagnetic center with Ni-ions in natural diamonds//Doklady of RAS,1994,v.334, N 6, p.755-758
2. Bershov L.V., Mineeva R.M., Speransky A.V., Titkov S.V. Paramagnetic centers in Yakutian diamonds: occurrence and associations// International Geochemistry (in press)
3. Mineeva R.M., Titkov S.V., Bershov L.V.,Speransky A.V EPR-classification of natural diamonds//Doklady of RAS (in press)