

## **EPR study of the CaF<sub>2</sub> powder mechanochemical doping with rare-earth ions**

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### **Abstract**

In the present work we show with electron paramagnetic resonance (EPR) spectroscopy that in the process of the mechanochemical doping of the CaF<sub>2</sub> fine particles with Er<sup>3+</sup> and Yb<sup>3+</sup> ions the cubic symmetry rare-earth (RE) ion centers are formed with the concentration proportional to the particles surface in the sample. Amount of the mechano-doped RE-ion centers is proportional to  $\eta\alpha$ , where  $\eta$  is the weight fraction of the RE fluoride in the initial mixture and  $\alpha \sim 0.8$ . Cubic symmetry centers dominate in the EPR spectrum up to  $\eta = 0.1$ . A hypothesis of the cubic RE-ion center formation is proposed according to which its origin is associated with the presence of the ideal cleavage planes in the CaF<sub>2</sub> crystals: during the mechano-doping a considerable fraction of the rare-earth ions is trapped between the cleavage planes of the agglomerating particles, thereby getting into the crystal field of the cubic symmetry. © Kazan Federal University (KFU).

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### **Keywords**

Electron paramagnetic resonance, Fluorite, Mechanochemical doping, Rare-earth ions