

Superhyperfine structure of the ESR spectra of Gd³⁺ impurity ions in LiYF₄ double fluoride

Aminov L., Gafurov M., Korableva S., Kurkin I., Rodionov A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017, Pleiades Publishing, Ltd. Electron spin resonance spectra of Gd³⁺ ions forming a small (~0.0001 at %) impurity in a LiYF₄ single crystal have been investigated in a wide temperature range from liquid helium to room temperature. A number of the fine-structure components of the spectrum exhibit a pronounced superhyperfine structure depending on the orientation of the external magnetic field with respect to the crystallographic axes. The superhyperfine structure was not observed in earlier ESR studies of double fluorides with a Gd³⁺ impurity.

<http://dx.doi.org/10.1134/S1063783417030039>

References

- [1] A. Abragam and B. Bleaney, *Electron Paramagnetic Resonance of Transition Ions* (Oxford University Press, Oxford, 1970; Mir, Moscow, 1972), Vols. 1, 2.
- [2] L. K. Aminov, I. N. Kurkin, and B. Z. Malkin, *Phys. Solid State* 55 (7), 1343 (2013).
- [3] A. A. Kaminskii, *Laser Crystals* (Nauka, Moscow, 1975) [in Russian].
- [4] Y. Vaills, J. Y. Buzare, and J. Y. Gesland, *Solid State Commun.* 45, 1093 (1983).
- [5] L. E. Misiak, S. R. Misra, and P. Mikolajczak, *Phys. Rev. B: Condens. Matter* 38, 8673 (1988).
- [6] L. K. Aminov, M. R. Gafurov, S. L. Korableva, I. N. Kurkin, and A. A. Rodionov, *Phys. Solid State* 57 (12), 2400 (2015).
- [7] X. Wishwamitar and S. P. Puri, *J. Chem. Phys.* 61, 3720 (1974).
- [8] L. K. Aminov, A. A. Ershova, S. L. Korableva, I. N. Kurkin, B. Z. Malkin, and A. A. Rodionov, *Phys. Solid State* 53 (11), 2240 (2011).
- [9] C. M. Bowden and J. E. Miller, *Phys. Rev. Lett.* 19, 4 (1967).
- [10] R. H. Borcherts, T. Cole, and T. Horn, *J. Chem. Phys.* 49, 4880 (1968).
- [11] S. Lee, A. J. Bevolo, and C.-C. Yang, *J. Chem. Phys.* 60, 1628 (1974).