

Application of positron annihilation techniques for metals, semimetals and semiconductors studies in a low background conditions

Khokonov A Kh^{1,2,@}, Taer M S², Akhmatov Z A²,
Gangapshev A M^{1,2} and Gezhaev M M¹

¹ Institute for Nuclear Research of the Russian Academy of Science, Prospekt 60-letiya Oktyabrya 7a, Moscow 117312, Russia

² Kabardino-Balkarian State University, Chernyshevskogo Street 173, Nalchik, Kabardino-Balkaria 360004, Russia

@ azkh@mail.ru

Currently, positron annihilation spectroscopy methods are finding wider application for solving the problems of restoring the electronic structure of matter. We used Doppler spectroscopy of the annihilation peak to determine the electronic structure of metals: a-Co, Cu, semimetals including potassium intercalated graphite, silicium and semiconductors, namely pyrite. The experiments were carried out with $Na - 22$ positron source in low-background conditions of the Baksan neutrino observatory INR RAS. In contrast to the previous work [1], we proposed a two-detector scheme and the certain orientation of the crystal relative to the detection axes. For the above samples, the possibility of determining the type and concentration of vacancies is also discussed on the basis of the technique for measuring the positronium lifetime described in [2].

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- [1] Taer M, Gangapshev A, Khokonov A and Akhmatov Z 2019 *Proceedings of the Kabardino-Balkarian state university* **9** 43–49
- [2] Kamiyama E, Sueoka K, Izunome K, Kashima K and etal 2013 *ECS Solid State Letters* **2** 89–90