

Crystal Structure and Physical Properties of New Ternary Gallides $\text{Eu}_2\text{Rh}_3\text{Ga}_9$ and $\text{Eu}_2\text{Ir}_3\text{Ga}_9$

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Dedicated to Professor Wolfgang Jeitschko on the occasion of his 70th birthday

The compounds $\text{Eu}_2\text{Rh}_3\text{Ga}_9$ and $\text{Eu}_2\text{Ir}_3\text{Ga}_9$ were synthesized by melting the elements in sealed tantalum tubes with subsequent annealing at 600 °C. Both gallides are isotypic with $\text{Y}_2\text{Co}_3\text{Ga}_9$ (space group *Cmcm*, Pearson symbol *oC56*, *Z* = 4) as evidenced by single crystal structure analysis: *a* = 12.9902(6), *b* = 7.6141(4), *c* = 9.7433(5) Å, *R_F* = 0.025, 617 structure factors, 42 variable parameters for $\text{Eu}_2\text{Rh}_3\text{Ga}_9$, and *a* = 13.0371(7), *b* = 7.6017(4), *c* = 9.6972(6) Å, *R_F* = 0.032, 645 reflections, 42 variables for $\text{Eu}_2\text{Ir}_3\text{Ga}_9$. Magnetic susceptibility measurements as well as X-ray absorption spectra indicate the $4f^7$ electronic configuration of europium (Eu^{2+}) with significant admixture of the $4f^6$ state in both compounds.

Key words: Europium, Gallium, Intermetallic Compounds, Magnetic Properties,
X-Ray Absorption Spectra