$RE_4B_4O_{11}F_2$ (RE = Eu, Dy): New Phases Isotypic to the Fluoride Borate $Gd_4B_4O_{11}F_2$

Almut Pitscheider, Michael Enders, and Hubert Huppertz

Institut für Allgemeine, Anorganische und Theoretische Chemie,
Leopold-Franzens-Universität Innsbruck, Innrain 52a, 6020 Innsbruck, Austria

Reprint requests to H. Huppertz. E-mail: Hubert.Huppertz@uibk.ac.at

Z. Naturforsch. **2010**, *65b,* 1439 – 1444; received September 17, 2010

The rare-earth fluoride borates $RE_4B_4O_{11}F_2$ (RE = Eu, Dy) were synthesized in a Walker-type multianvil apparatus from the corresponding rare-earth oxides and fluorides, and boron oxide. $Eu_4B_4O_{11}F_2$ was obtained under high-pressure/high-temperature conditions of 5 GPa and 900 °C, and $Dy_4B_4O_{11}F_2$ at 8 GPa and 1000 °C. The single-crystal structure determinations revealed that both compounds are isotypic to $Gd_4B_4O_{11}F_2$, crystallizing in the space group $C2/c$ (Z = 4) with the parameters a = 1368.2(3), b = 465.4(1), c = 1376.6(3) pm, β = 91.2(1)°, V = 0.8765(3) nm^3, R_1 = 0.0232, and wR_2 = 0.0539 (all data) for $Eu_4B_4O_{11}F_2$ and a = 1349.5(3), b = 460.9(1), c = 1362.5(3) pm, β = 91.3(1)°, V = 0.8472(3) nm^3, R_1 = 0.0353, and wR_2 = 0.0729 (all data) for $Dy_4B_4O_{11}F_2$. These phases are entirely different from the recently discovered lanthanum fluoride borate $La_4B_4O_{11}F_2$, which exhibits the same constitution in another structure type with space group $P2_1/c$.

Key words: Rare Earth, Fluoride, Borate, High Pressure, Crystal Structure