substance: boron compounds, general properties
property: structure group of the orthorhombic $MgAlB_{14}$-type borides

The unit cell consists of four B_{12} icosahedra, which are arranged in a distorted hexagonal packing, eight additional single B atoms and up to eight metal atoms, i.e in total 64 atoms in the idealized unit cell (Fig. 1). The structure is characterized by a largely covalently bonded network formed by chains of icosahedra arranged parallel to the *c* axis and in the <110> direction. The external bonds of the icosahedra are part directly inter-icosahedral and part indirectly inter-icosahedral via the single boron or metal atoms. The metal atoms are accommodated outside the B_{12} icosahedra in the large holes of the boron framework. In the most cases the metal sites are only partly occupied.

Representatives of the orthorhombic $MgAlB_{14}$ type borides

Chemical formula (idealized)	Structural formula	
$LiAlB_{14}$		93H, 80H, 81H
$NaB_{0.8}B_{14}$		70N
$MgAlB_{14}$		93H, 83H,
	Fe-doped	93G,
Mg_2B_{14}		81H, 81G
$TbAlB_{14}$		88K, 91D
$DyAlB_{14}$		88K, 91D
$HoAlB_{14}$		88K, 91D
$ErAlB_{14}$		88K, 92K
$TmAlB_{14}$		93K
$YbAlB_{14}$		88K
$LuAlB_{14}$		88K
$YAlB_{14}$		92K, 92K

New rare earth aluminum borides with structure of $MgAlB_{14}$ type [88K].

Comparison of the interatomic distances in $LiAlB_{14}$, $MgAlB_{14}$, Mg_2B_{14} and $NaB_{0.8}B_{14}$ in [81H].

Optical absorption spectra of $LiAlB_{14}$, $MgAlB_{14}$, $ErAlB_{14}$, in particular in the range of the absorption edges in Fig. 2 [93W].

Optical reflectivity spectra of $LiAlB_{14}$ and $MgAlB_{14}$ in Fig. 3 [93W].

Optical absorption spectra of $LiAlB_{14}$ and $ErAlB_{14}$ in the range of single atom vibrations in Fig. 4 [93W].

Optical absorption spectra of $LiAlB_{14}$, $MgAlB_{14}$, $ErAlB_{14}$ in the range of the phonon frequencies in Fig. 5 [93W].

Optical and electronic properties of the orthorhombic $MgAlB_{14}$-type borides in [93W].

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Fig. 1.

$MgAlB_{14}$ type orthorhombic structure group. Structure in a view parallel to [100]. Single atoms with $-1/4 < x < +1/4$ are shown [77M].

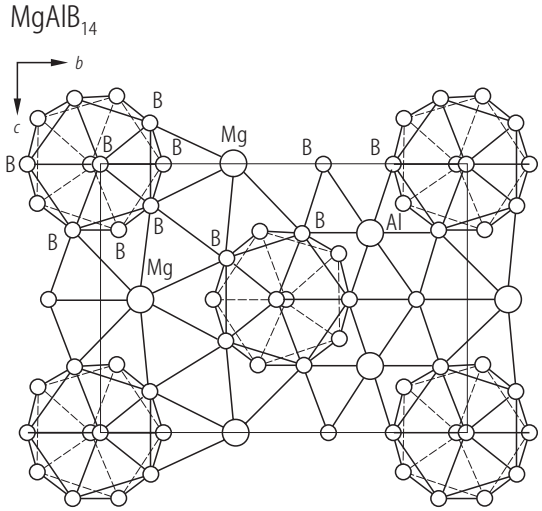

Fig. 2.

$MgAlB_{14}$ type orthorhombic structure group ($LiAlB_{14}$, $MgAlB_{14}$, $ErAlB_{14}$). Optical absorption spectra, in particular in the range of the absorption edge [93W].

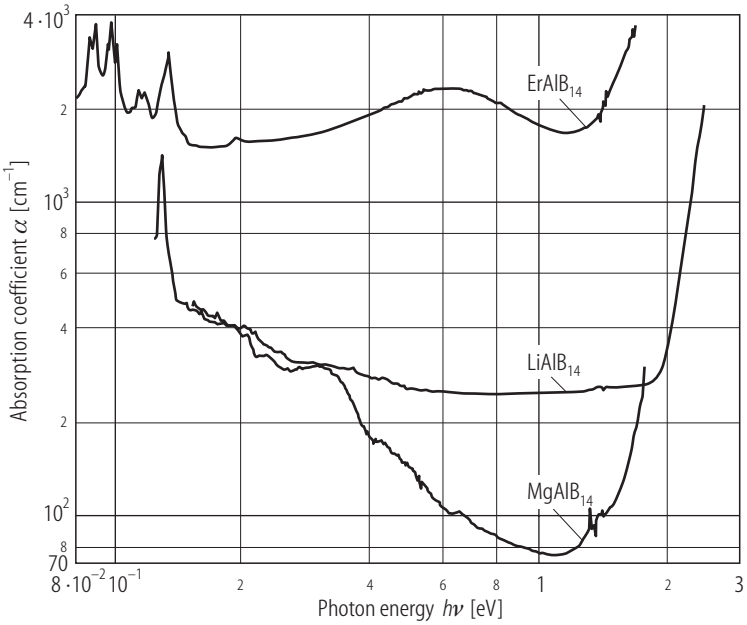

Fig. 3.

$MgAlB_{14}$ type orthorhombic structure group ($LiAlB_{14}$, $MgAlB_{14}$). Reflectivity spectra [93W].

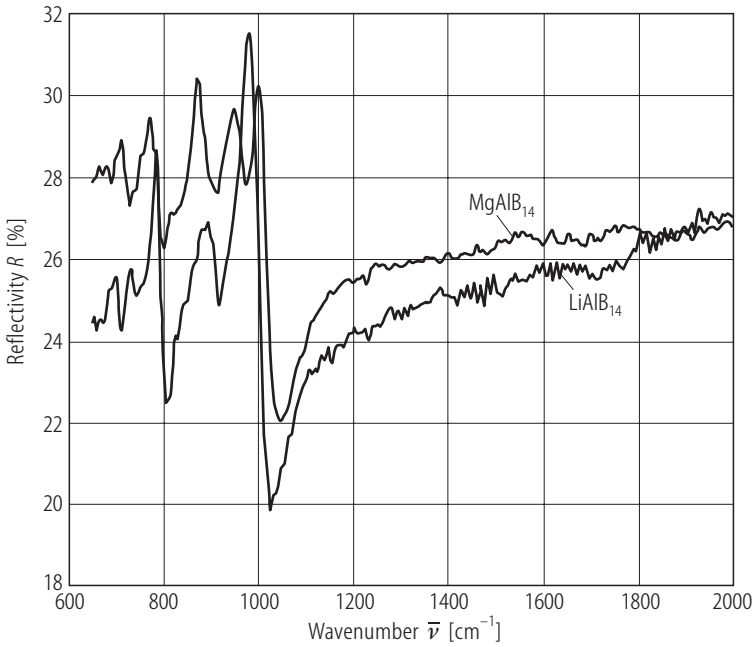

Fig. 4.

$MgAlB_{14}$ type orthorhombic structure group ($LiAlB_{14}$ (left ordinate), $ErAlB_{14}$ (right ordinate)). Optical absorption spectra in the range of single atom vibrations [93W].

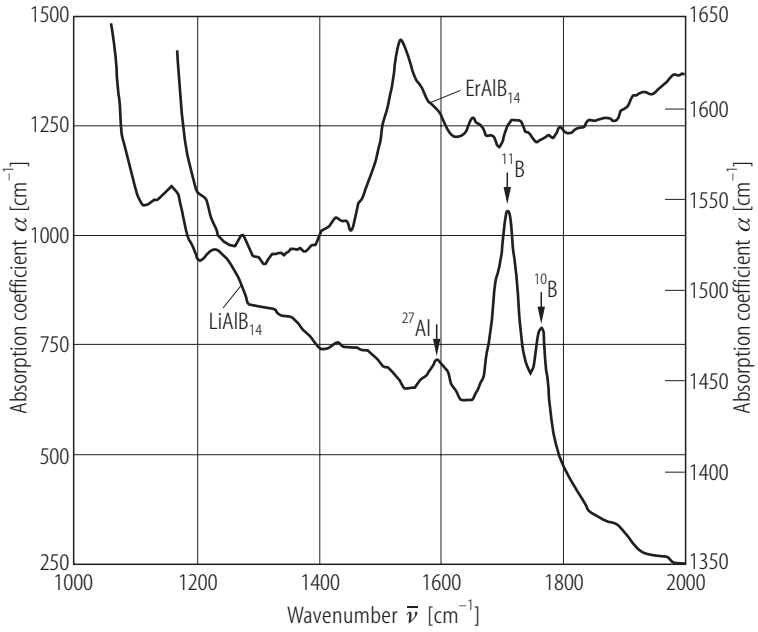

Fig. 5.

$MgAlB_{14}$ type orthorhombic structure group ($LiAlB_{14}$, $MgAlB_{14}$, $ErAlB_{14}$). Optical absorption spectra in the range of phonon frequencies [93W].