

New model for conversion process in RCu_2 ($R = \text{rare earth}$)

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Since the 1990s [1,2] a magnetic field induced conversion effect in RCu_2 (space group $Imma$) compounds has been observed. To force the conversion a strong magnetic field has to be applied in the a - c plane away from the magnetic easy axis. As the magnetization properties of the hard and easy axis exchange during the conversion, this effect has been misleadingly called *magnetic axis conversion effect* [2]. We present a complete new conversion model and its experimental proof: the twin-domain model. It explains the change of the easy axis, which is itself a consequence of structural changes. During the conversion the atoms undergo a slight shift in their atomic positions illustrated by the highlighted atoms in the figure. Due to the *pseudohexagonal structure* the crystal decays into two identical twin-domains, rotated along b direction by ± 60.52 deg. As one consequence a giant magnetostrictive effect of more than two percent in a direction occurs [3]. This magnetostructural effect has been studied intensely by neutron scattering.

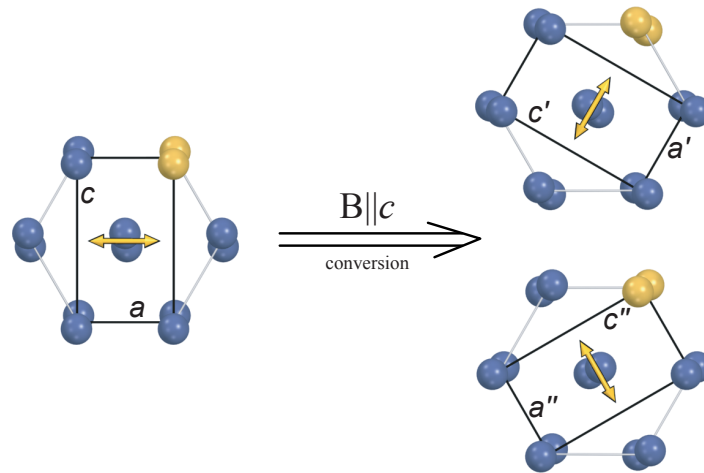


Figure 1: The rare earth atomic positions before (left) and after (right) the conversion with the magnetic field perpendicular to the easy axis. The unit cell is virtually rotated. The original twin-domain (left) gets entirely depopulated. Two new twin-domains arise. Only the rare earth ions are shown. The double arrows symbolize the easy axis.

References

- [1] Y. Hashimoto *et al.* J. Magn. Magn. Mat. **90&91** (1990) 49-50.
- [2] Y. Hashimoto *et al.* Phys. Rev. Lett. **72** (1994) 1922.
- [3] S. Kramp *et al.* Europ. Phys. J. B **18** (2000) 559.