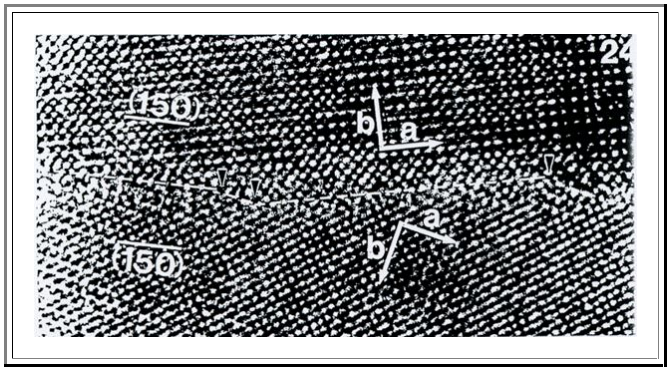
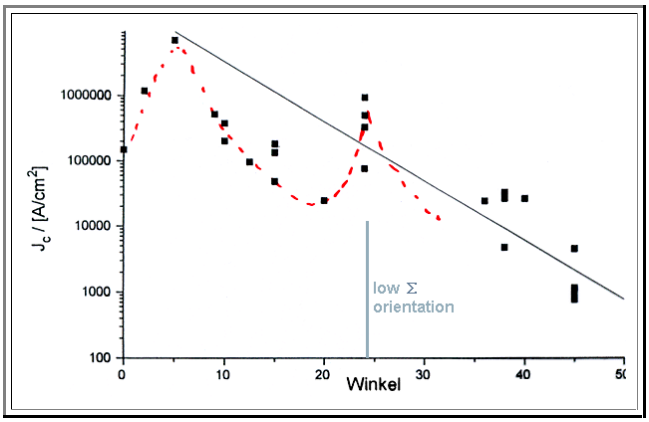
Grain Boundaray in Superconducting $YBa_2Cu_3O_7$ and Critical Current Density

Illustration

The **HRTEM** picture shows a grain boundary in the famous high-temperature superconductor **$YBa_2Cu_3O_7$**. This boundary was intentionally made with a specific orientation. Facetting can be clearly seen. The picture and the following results are from the **TEM** group of Prof. Urban from the Jülich Research Center.



A whole collection of boundaries was made and the critical current densities measured. The critical current density is the current density at which the superconducting state of the material is destroyed. The relation obtained is shown below.



In general, the critical current density decreases wit increasing misorientation. But around a specific misorientation it has a remarkable maximum. It comes as no surprise that this specific misorientation corresponds to a low Σ orientation.