

Hydride Phase in *c*-Axis Oriented $\text{YBa}_2\text{Cu}_3\text{O}_7$ Thin Films*

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c-Axis oriented $\text{YBa}_2\text{Cu}_3\text{O}_7$ films were charged with hydrogen from the gas phase at $p = 100$ mbar and $T = 463$ K. The hydrogen concentration was measured by the ^{15}N nuclear reaction method. At a hydrogen concentration of $[\text{H}]/\text{cell} = 2$, a new phase (hydride) is observed in X-ray diffraction. The new phase has a 16% larger *c*-axis parameter than the original material and is not superconducting. Based on structure factor calculations, a suggestion for the structure of the hydride phase is made.

1. Introduction

Recently we published a short note [1] in which we showed that hydrogen incorporation in $\text{YBa}_2\text{Cu}_3\text{O}_7$ leads to a new phase with a 16% larger *c*-axis than the original material. In the meantime we have repeated this experiment several times and always find the same result.

The *c*-axis lattice parameter of the new phase is within the experimental error exactly the same as that of $\text{YBa}_2\text{Cu}_4\text{O}_8$ (124 phase) and therefore a mix-up of the two phases could be possible. We will show here that this is not the case and that the new phase has a genuine new structure which resembles but is not the same as that of $\text{YBa}_2\text{Cu}_4\text{O}_8$. This is the first identification of a hydride phase in YBaCuO systems.

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