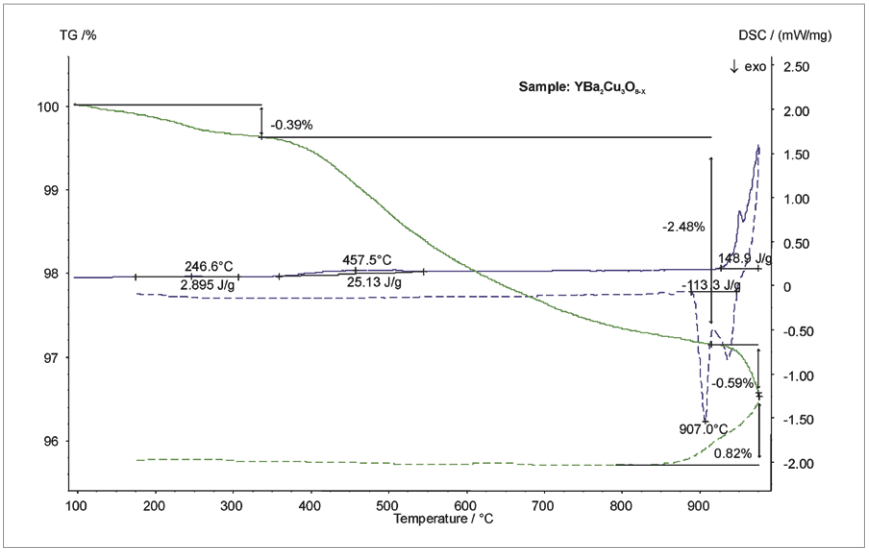
APPLICATION**SHEET**

CERAMICS – ELECTRONICS

YTTRIUM BARIUM COPPER OXIDE (YBCO)

Yttrium Barium Copper Oxide is a so-called high-temperature superconductor. The phenomenon of superconductivity was discovered by H. Kammerling-Onnes in 1911. Until 1986, superconductivity of metals was restricted to temperatures of the order of liquid helium temperature. The discovery of superconductivity in certain oxides at temperatures above 35K (so-called high-temperature superconductivity) by Bednorz and Müller launched a flurry of research into these superconducting materials. YBCO was the first material to become superconducting above 77 K, the boiling point of liquid nitrogen, which was a break through in the refrigerant used to cool the material to below the critical temperature. The superconducting properties of YBCO depend strongly on its oxygen content as well as on its microstructure – properties which both can be strongly affected by thermal treatment. Prominent applications of high-temperature superconductors are for example superconducting magnets, wires, current limiters and so-called Josephson-junctions.



Instrument

STA 449 C *Jupiter*®

Test Conditions

Temperature range	RT ... 1000°C
Heating/cooling rates	10 K/min
Atmosphere	Argon at 70 ml/min
Sample mass	22 mg
Crucible	Pt
Sensor	TG-DSC type S

Results

The temperature-dependent mass change (TG) and heat-flow rate (DSC) of an YBCO sample were simultaneously measured. The full lines refer to the heating, the dashed lines to the cooling. Upon heating, three mass-loss steps were observed which are due to the release of humidity at low temperatures and due to reduction of the sample at higher temperatures. In general, simultaneous thermal analyzers are ideal tools for the preparation and characterization of ceramics such as high-temperature superconductors.

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