# LASER INDUCED MODIFICATIONS OF THIN FILMS OF $YBa_2Cu_3O_{7-x}$

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Investigations on the laser induced oxidation and reduction of $YBa_2Cu_3O_{7-x}$ thin films are presented. For laser processing excimer laser deposited thin films on MgO substrates with film thickness of about 1 μm were employed. The samples were placed into a reaction chamber which was operated with oxigen with pressures of up to 10 bar or with constant flow of hydrogen or oxigen with pressures of up to 2 bar. The laser inducted reaction was achieved by focusing a 514 nm $Ar^+$ - laser beam (waist diameter 50 μm) onto the sample surface. The reaction chamber was translated perpendicularly to the laser beam with scanning velocities of 0.84, 8.4 and 84 μm/s.

The laser produced stripes were characterized by a dc electrical conductivity and optical reflectivity measurments, optical microscopy, and scanning electron microscopy.

Optical micrographs show dark oxidized stripes on non superconductive films. An increase of laser power leads to the melting of films in the middle of the stripe with dark sides. The reflected $Ar^+$ - laser light was investigated as a function of laser power. Three regions were observed.

A linear increase of refected intensity, a decrease of slope determined by oxidation, and decrease of reflection by melting.

The temperature dependence of the resistivity of stripes produced with a laser power of 1600 mW shows the appearance of zero resistance for scanning velocities of 0.84 - 84 μm/s. The transition temperature increases from 42 K to 74 K with the increase of the laser beam dwell time. The decrease of laser power leads to the decrease of the ion temperature.