

investigations using x-ray diffraction in standard Bragg–Brentano geometry as well as texture measurements are presented in the next part. Finally, the superconducting properties of a representative thin film sample are shown and analyzed.

## II. EXPERIMENTAL

### A. Target preparation

The target preparation is the similar to the feed rod preparation for TFZ single crystal growth [11]: For the target, lutetium swarfs of high purity was cut into small pieces (weight approximately  $< 500$  mg each) under argon atmosphere and cold-pressed at 30 kN together with a mixture of carbon (99.9+ wt%) and nickel powder (99.99 wt%, both from *MaTeck*) and boron powder (99.52 wt% from *Eagle Picher*) in a stoichiometric 1:2:2:1 ratio. The received pill was molten several times in an induction melting oven under argon atmosphere (background pressure  $< 2 \cdot 10^{-5}$  mbar) at about 1550 °C and homogenized for a few minutes at about 1100 °C. The molten pill was cooled down and again molten two times (once from each side) in an arc discharge oven under argon atmosphere to achieve an oblate shape of approximately 20–25 mm diameter. Rapid cooling on a water-cooled copper plate was used to suppress large grain growth. Finally, the target was laterally cut with a water-cooled wire saw and slightly grinded to its necessary shape. After sawing, some small lunkers (diameter roughly smaller than 1 mm) were observed in the center of the target, which were removed by grinding as good as possible. Pictures of selected steps of the target production process are shown in Fig. 1.

### B. Sample preparation

Thin film deposition took place in a standard ultra high vacuum chamber with a base pressure of about  $2 \cdot 10^{-9}$  mbar. The laser ablation was performed with a KrF laser (*Lambda Physik LPX 305*) at a wave length of 248 nm. The laser spot size was set to 1.5 x 4 mm approximately and the laser energy per pulse was chosen at 250 mJ giving an energy density of about 4 J/cm. A deposition rate of 0.005–0.01 nm per laser pulse was measured with an *Inficon* rate monitor depending on the laser fluence and the target roughness using a target–substrate distance of 45 mm. The total film thickness  $d$  was intended to 200