boundaries, but rather to illustrate differences in behavior between crystalline Ge and non-crystalline Ge of different starting densities.

## 2. Experimental

The non-crystalline Ge used was prepared using a turbo-pumped Ultek 3140-65 sputtering device. The hot-pressed Ge target had a purity of 99.9996%. The films (thickness 15–30 $\mu$m) were deposited on glass microscope slides in a 20 $\mu$m Ar atmosphere with a target to substrate distance of 52 mm. The high-density films were prepared with the substrate biased, so that $\approx 20\%$ of the RF voltage applied to the target was applied to the substrate. Densities were determined using a weight geometry technique with an accuracy of $\pm 0.3$ g/cm$^3$. Film thickness was determined using a broken edge under an optical microscope.

Prior to the high-pressure experiments the non-crystalline Ge was scraped off the glass substrate and ground. The low and average density non-crystalline Ge films remained non-crystalline after this treatment. However, the high-density non-crystalline Ge showed slight crystallization of Ge I after grinding (fig. 1), but the bulk of the material remained clearly non-crystalline.

Pressure was generated in opposed anvil devices. The experimental technique has been described elsewhere [7]. Anvils with a working face diameter of 6.35 and 4.76 mm were used. The samples were contained in nickel rings and covered with discs of platinum 10% rhodium foil. At all times care was taken to ensure favorable diameter/thickness ratios [11]. Temperatures were obtained using split furnaces, and temperature was measured using chromel/alumel thermocouples wrapped around the sample position but not pinched by the anvils. The products were examined using X-ray diffraction techniques. The quenching procedure was to drop temperature while

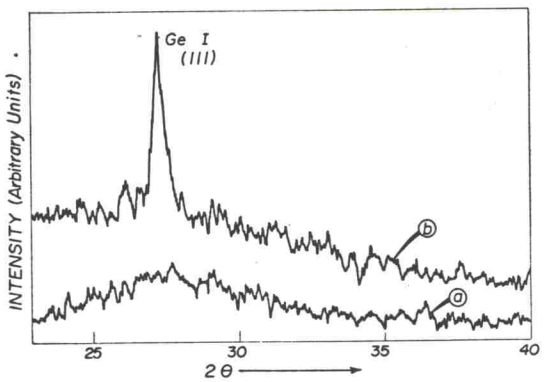


Fig. 1. Portions of X-ray diffraction traces made using $CuK_\alpha$ radiation to illustrate the partial crystallization of high-density non-crystalline Ge by grinding. (a) Prior to grinding, (b) after grinding.