# Preparation of polycrystalline FeTe1−xSx (x = 0.00–0.30) via solid-state reaction method at ambient pressure

## ABSTRACT

Polycrystalline samples with nominal composition FeTe1ī x S x (x = 0.00ï 0.30) were synthesized via solid state reaction method with intermittent grinding in argon gas flow. X-ray diffraction (XRD) patterns revealed the tetragonal structure (space group P4/nmm) of the samples with the presence of impurities Fe3O4 and FeTe2. By substitution with S, the a and c lattice parameters shrink probably due to the smaller ionic radius of S2ī compared to Te2ī . Scanning electron microscopy images showed that the samples developed plate-like grains with increasing S substitution. Substitution of Te with S suppresses the structural transition of the parent compound FeTe as shown by both the temperature dependence of resistance and magnetic moment measurements. All of the S-substituted samples showed a rapid drop of resistance at around 9ï 10 K but zero resistance down to 4 K was not observed. In addition, negative magnetic moment corresponds to diamagnetism was detected in the samples for x = 0.25 and 0.30 suggesting the coexistence of magnetic and superconducting phase in these samples. The magnetization hysteresis loops measured at room temperature showed ferromagnetic behavior for the pure and S substituted samples. However, the magnetization, rentivity and coercivity decreased with S content.

**Keyword:** Polycrystalline; FeTe1ī xSx (x = 0.00ï 0.30); Solid state reactions