Phase transition of bismuth telluride thin films grown by MBE

A previously unreported phase transition between Bi2Te3 and Bi4Te3 in bismuth telluride grown by molecular beam epitaxy is recorded via XRD, AFM, and SIMS observations. This transition is found to be related to the Te/Bi beam equivalent pressure (BEP) ratio. BEP ratios below 17 favor the formation of Bi4Te3 while Bi2Te3 is formed at higher ratios. Transport measurements reveal that Bi2Te3 has higher electron mobility than Bi4Te3.