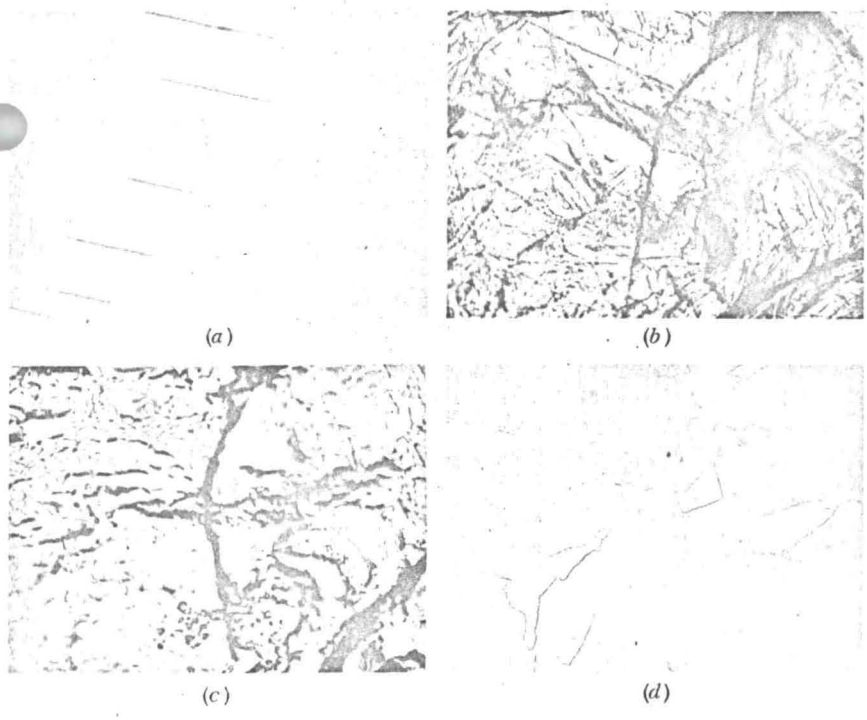

Fig. 7—Structural changes in single-crystal bismuth after I-II-III transitions. (*a*) Original structure; (*b*) after transition; (*c*) intermediate repolish; (*d*) final structure. X100. Reduced approximately 42 pct for reproduction.

by slight repolishing as shown in (*c*) of the subject figures where the gradual disappearance of the original Phase I and superimposed Phase II boundaries is evident.

As can be noted, the final or residual structure, after complete repolishing, is polycrystalline in nature and is the same whether the sample was originally single or polycrystalline or passed through the I-II or I-II and II-III transitions. It is characterized by some twinned regions, as is commonly encountered in this material, and many apparently isolated grains completely surrounded by a larger grain or matrix region.

An interesting characteristic of the polycrystalline structure resulting from cycling through the transitions is its drastically enhanced grain boundary migrations. It was observed that, regardless of the initial structure or whether it passed through the I-II or II-III transition, this residual polycrystalline structure becomes single crystalline, based on an optical observation of the polished surface, after annealing at 160°C for 3 hr. Furthermore, at 120°C for 3 hr, the residual structure consisted of only two to three grains intersecting the polished surface. As a matter of comparison, the as-extruded material, which had a grain size comparable

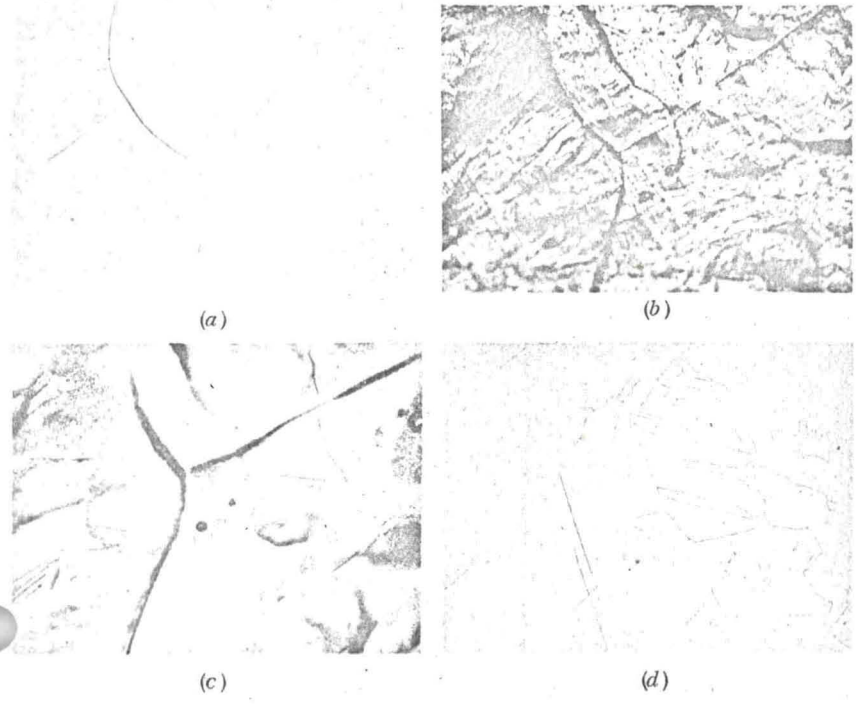

Fig. 8—Structural changes in polycrystalline bismuth after I-II-III transitions. (*a*) Original structure; (*b*) after transition; (*c*) intermediate repolish; (*d*) final structure. X100. Reduced approximately 42 pct for reproduction.