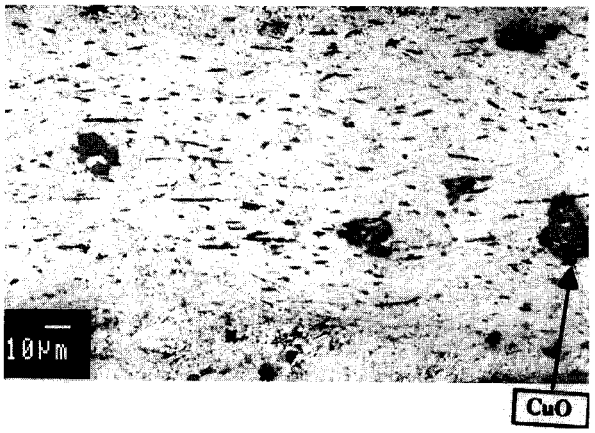
(*a*)

(*b*)

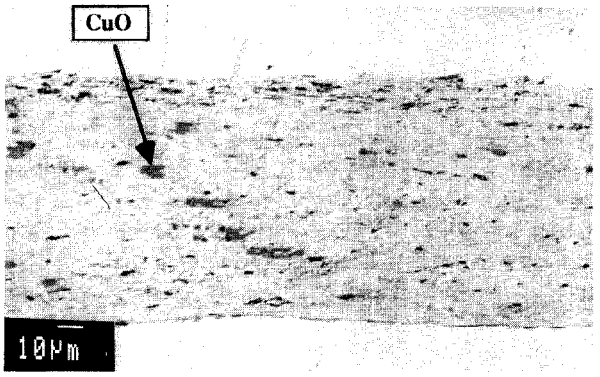
(*c*)

Figure 9. Optical micrographs of PIT tapes treated for (*a*) 12 h without pressing, (*b*) 24 h with one intermediate pressing and (*c*) 50 h with two intermediate pressings.

sintering duration between pressing is judged economically impractical to form the basis of an optimal thermomechanical processing schedule. In addition to the observation that the 25 h sintering duration appears to provide the best result, it can be seen from figure 7 that the highest J_c values for all the sequences are obtained within three pressing



(*a*)



(*b*)

Figure 10. SEM micrographs of PIT tapes treated for (*a*) 12 h without pressing and (*b*) 50 h with two intermediate pressings.

steps, which is consistent with the results of set A.

Results from set C, where the second and third sintering durations were varied from 25 h to 50 h, are presented in figure 8. Also included for comparison is the variation in J_c of samples in sequence 7 where the sintering duration was fixed at 25 h. It can be seen from this figure that a second sintering duration of 25 h results in a higher J_c value than the 50 h alternative. This is in agreement with a previous study that showed for samples that have been subjected to 20 h of initial heat treatment the optimum second sintering duration is 27 h [17] and J_c dropped by 50% within 7 h of this optimized value. When the third sintering duration is decreased from 50 h to 25 h, i.e. from sequence 9 of 25–25–50–$\cdots$ to sequence 7 of 25–25–25–25–$\cdots$, the maximum J_c value is also decreased, thereby indicating that excessive amounts of mechanical work can be detrimental after a substantial amount of precursor powder has been converted to Bi-2223.

In the thermomechanical treatment of PIT Bi-2223 tapes, it is generally agreed that a liquid phase is formed from the precursor powder which aids in the Bi-2223 phase formation. During the early stages of thermomechanical treatment, mechanical pressing has beneficial effects on J_c since it improves the c-axis alignment of the partially converted Bi-2223 grains. In