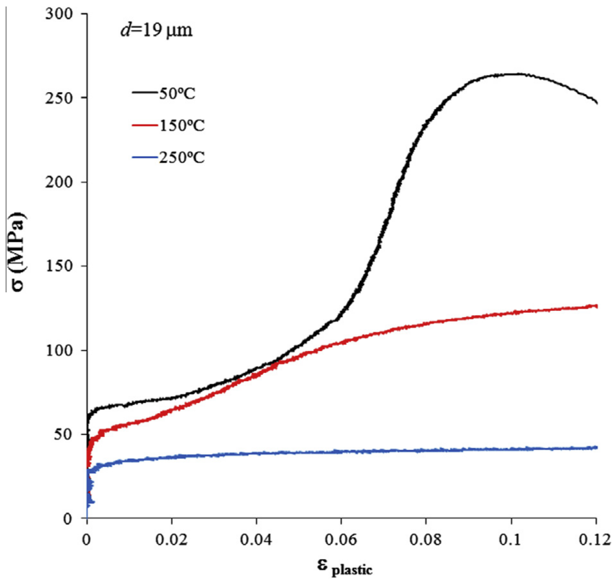

Fig. 12. Compressive true stress–true strain curves corresponding to the pure Mg polycrystal with $d = 19$ μm deformed at 50, 150 and 250 °C and at an initial strain rate of 10^{-3} s^{-1}.

notably with temperature, being 14% at 150 °C and almost negligible at 250 °C. Indeed, with increasing temperature, again, strain localization along deformation slip bands takes place. Fig. 13c and d consists of two SEM micrographs illustrating the deformation bands developed in the pure Mg polycrystal with $d = 19$ μm after compression at 10^{-3} s^{-1} at 150 °C (Fig. 13c) and at 250 °C (Fig. 13d). EBSD-assisted slip trace analysis of, respectively, 154 and 76 traces, revealed that, at 150 °C, 78% corresponded to basal slip, 8% to prismatic ⟨a⟩ slip, and 14% to pyramidal ⟨c+a⟩ slip, while at 250 °C 61% corresponded to basal slip, 13% to prismatic ⟨a⟩ slip, and 26% to pyramidal ⟨c+a⟩ slip. Thus, these results confirm the occurrence of a transition from twinning to basal slip dominated flow when the temperature increases from 50 °C to 150° and to 250 °C. The increased contribution of non-basal slip at the highest temperature (250 °C) is consistent with the well-known decrease of the CRSS of prismatic and pyramidal ⟨c+a⟩ systems with increasing temperature [31,36], as well as with the onset of substantial cross-slip from basal to non-basal planes (Fig. 14) [58].

Let's examine the transition from twinning to basal slip dominated flow at 150 °C. Fig. 15a illustrates the misorientation distribution histogram corresponding to GBs located within the deformation bands developed at 150 °C in the pure Mg polycrystal with $d = 19$ μm. GBs allowing slip transfer (blue) and arresting slip (red) are differentiated. It can be seen that θ_{th} increased from 30° at 50 °C (Fig. 4) to 37° at 150 °C. This is, again, consistent with a relaxation of constraints at GBs with increasing temperature. The connectivity between grains favorably-oriented for basal slip, i.e. with $SF_{basal} > 0.2$ (Fig. 15b) can be estimated by calculating the fraction of boundaries with $\theta < 37°$ ($f_{\theta<37°}$), which is 72%, and the fraction of J_2 and J_3 junctions (f_{J2+J3}), which is 63% (Fig. 15c). It can be seen that f_{J2+J3} at 150 °C is larger than at 50 °C (51%). Furthermore,

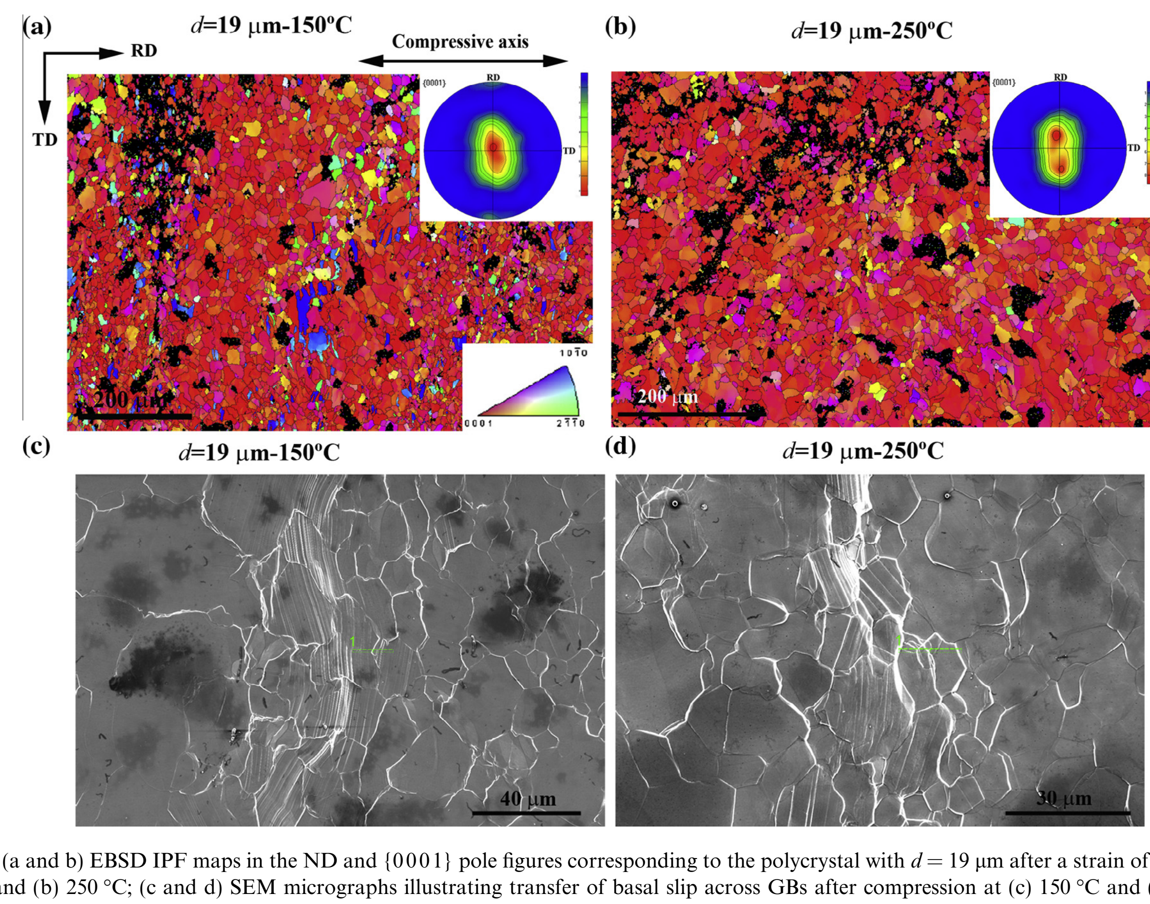

Fig. 13. (a and b) EBSD IPF maps in the ND and {0001} pole figures corresponding to the polycrystal with $d = 19$ μm after a strain of ~10% at (a) 150 °C and (b) 250 °C; (c and d) SEM micrographs illustrating transfer of basal slip across GBs after compression at (c) 150 °C and (d) 250 °C.