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Analysis of flow softening during hot deformation of Ti-17 alloy with the lamellar structure

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1 **Analysis of flow softening during hot deformation of Ti-17 alloy with**  
2 **the lamellar structure**

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8 **Abstract:** Flow softening of Ti-17 alloy with the lamellar structure during hot  
9 deformation is investigated in this work. For this purpose, hot compression tests are  
10 conducted with strain rate of  $0.001-10s^{-1}$  at  $780-860^{\circ}C$ . The experimental results are  
11 analyzed through theoretical calculation and microstructure observation (SEM, TEM  
12 and EBSD). Flow softening extent of Ti-17 alloy increases with the decreasing  
13 temperature and increasing strain rate. The softening behavior can be explained by the  
14 two aspects: deformation heating and microstructure changes. Deformation heating  
15 effect is caused by temperature rise, which is more serious at higher strain rate.  
16 Microstructure changes include the bending, kinking, rotation and separation of the  
17 lamellar alpha, which can be defined as the pan-globularization of alpha phase. In  
18 addition, the EBSD observations indicate that the continuous dynamic  
19 recrystallization occurs in beta phase. Microstructure changes of alpha and beta  
20 phases influence together flow softening behavior. Specifically, the  
21 pan-globularization of alpha phase and continuous dynamic recrystallization of beta  
22 phase result in flow softening of Ti-17 alloy.

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