

Formation of Twinned WC Grains during Carbonization of Eta Phase (W_3Co_3C)

Jong-Dae Kim, Kern-Woo Lee, Joo-Wan Lee, Moshe Sharon, Suk-Joong L. Kang*

TaeguTec Ltd., Daegu, Korea

*Department of Materials Science and Engineering,
Korea Advanced Institute of Science and Technology, Daejeon, Korea

Abstract

Twinned WC grains are sometimes observed in WC powder and sintered WC-Co alloys. The present investigation has studied the formation of twinned WC grains during carbonization of an Eta phase. Eta grains were carbonized at 700-1400 °C for 1 min to 9h. Twinned WC grains formed during the carbonization. Crystallographic characterization of the formed twins have been made using SEM and TEM. The formation of twins was found to be affected by the carbon activity during carbonization. Twins formed under high carbon activities while no twins formed under low carbon activities. Two kinds of twins with different orientations have been observed. The present experimental observation suggests that the twins formed via 2-dimensional nucleation and layer-by-layer growth on small WC clusters under high supersaturation and high driving force for the growth of WC grains.