Transmission electron microscopy study on the precipitation behavior of MC carbide in a V and Mo - containing high Mn steel

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Precipitation behavior of MC carbide in a V and Mo- containing high Mn steel was studied using a transmission electron microscope (TEM). An Fe-18Mn-based steel was fabricated by vacuum induction melting. The alloy was cold-rolled and then annealed at 850°C for 1~10 minutes. The evolution of volume fraction and average size of MC was investigated using high angle annular dark field - scanning TEM image and electron energy loss spectroscopy. As MC grows, coherent to incoherent transition of MC in austenite matrix reveals in high-resolution TEM images. The size-dependent chemical composition and lattice parameter of V-rich MC carbide were obtained in the carbon-extracted specimens. Based on the obtained experimental results, the role of Mo on the precipitation behavior of V-rich MC in the high Mn steel is elucidated.

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