

Nanocomposites and nanomaterials

Influence of Ti and Al nanoparticles on Structure and Properties of Constructional Steel

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It is well known that microalloying steels by nano-scaled nitrides lead to increasing of constructional steels properties [1, 2]. For inoculating vanadium and niobium additions with nitrogen have been used. For Ukrainian steel producers this way is unacceptable due to financial reasons. However inoculating by cheaper Ti and Al with N looks more promising. Constructional steel has been inoculated by Al+Ti+N. TEM shows the Ti(C,N) nanoparticles in the steel structure (Fig.1).

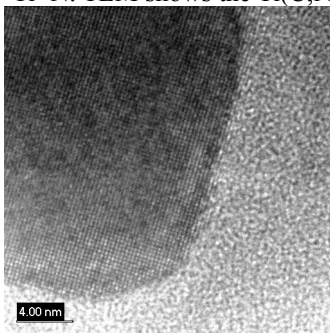


Fig.1. Ti(C,N) nanoparticle in the structure of investigated steel, TEM.

Also AlN and Ti(C,N)+AlN particles have been revealed in the steel structure. Further investigations show that these particles lead to grain refinement of steel structure. Also the nanoparticles lead to formation of acicular ferrite structure [3]. Therefore constructional steel inoculated by Al+Ti+N has higher properties and is cheaper than V+Nb+N analogues.

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2. H.K.D.H. Bhadeshia Bainite in Steels, The University Press, Cambridge, 2001, p. 237.
3. Investigation Of Acicular Ferrite Structure And Properties Of C-Mn-Al-Ti-N Steels// O.Uzlov, A. Malchere, V. Bolshakov, C. Esnouf// *Advanced Materials Research Vol. 23 (2007) pp. 209-212.*