Nanocomposites and nanomaterials

Investigation of Ti, Al and V based nanoparticles in steels

H.V.Drozhevska[1], Z.A. Dement'eva[2], A. Franke[3]

[1] *Prydniprovska State Academy of Cvil Engineering and Architecture, Mat.Sci Dep. Tchernyshevskogo str., 24-a, Dnipropetrovsk-49600, Ukraine.*
E-mail: anna.drozhevskaya@mail.ru

[2] *Institute of Ferrous Metals, NASU, Starodubov sqr 1, Dnipropetrovsk-49005, Ukraine.*

[3] *Insitute fur Eisen- und Stahl Technologie, TU Bergakademie, Leipziger str. 34, Freiberg-D-09596, Germany.*

It is well known that microalloying steels by carbides and nitrides forming elements lead to significant increasing of steels properties [1]. As carbides and nitrides forming elements V and Nb are widely used. Also Ti and Al can be used [2]. Rail steel microalloyed V+Ti and constructional steel inoculated by Al+Ti+N have been investigated.

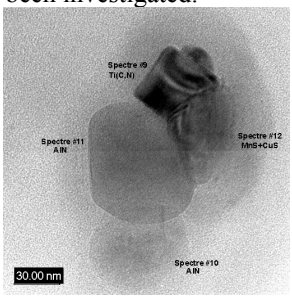

Fig.1. Ti(C,N)+AlN+MeS complex nanoparticle in the structure of investigated steel, TEM.

TEM and SEM investigations revealed formation mainly Ti(C,N,O) and Al(N,O) nanoparticles (as shown on Fig.1) instead of vanadium based nanoparticles as it has been expected for rail steel. Further investigations to reveal vanadium atoms behavior in rail steel structure will be conducting. These nanostructured materials look promising for developing new generation materials for rail road transport of Ukraine [3].

1. *Ю.З.* Бабаскин, С.Я. Щипицын, И.Ф. Кирчу Конструкционные и специальные стали с нитридной фазой, Киев, Наукова Думка 2005, 368 с.

2. 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*.

3. Development of chemical composition and conditions of treatment of cast units of a freight gondola car bogie of new generation// H. Drozhevska,

V.Bolshakov, O.Uzlov, O.Puchikov// Conf.Proceed.19th ISDM Freiberg 2012.