Nanoobjects microscopy

Orientation relationships of the nano particles of cementite and ferrite in the decomposition of low-carbon austenite

V.I. Bol'shakov, G.D. Suchomlin, V.I. Suchomlin

Prydniprovs'k State Academy of Civil Engineering and Architecture, .
Chernyshevskogo St., 24A, Dnipropetrovsk-49600, Ukraine.
E-mail: alma31@mail.ru

The methods of diffraction electron microscopy examined the morphology and orientation relationships (OR) (cementite-ferrite) during isothermal transformation in low carbon austenite in temperature interval 500…400 C.

At a temperature of 400 C with in isothermal conditions transformations there wos a formation of lower bainite with adherence between the ferrite and cementite OR I. V. Isaichev (ORI) [1]. The same results were obtained in the study of middle carbon steels [2].

At a temperature of 500 C with discovered particles of cementite in ferrites grains measuring about 2080 nm. Decoding microdifraction showed strict adherence to the ORI between the ferrite and cementite. Based on data from [3] on the likely compliance with OR Kurdyumov-Sachs [4] between the austenite and ferrite in diffusion mechanism of transformation of austenite and given OR Arbuzov-Kurdyumov [5] between the austenite and cementite, following conclusions were made.

Allocation of nano-cementite at the 500 C with occurs through diffusion at the front of transformation austenite with the following OR K-S and A-K with the formation of two daughter phases – ferrite and cementite with the implementation of the ORI between them.

1. *Isaichev I V.* Orientation cementite in tempered carbon steel // J Technical Physics.-1947.-**17.**– P. 835-838.
2. *Ohmori Y*. Crystallographic analysis of lower bainite transformation in Fe-0,7%C alloy // Materials Trans., JIM, – 1989, Vol. 30, No 7. – P 487-497.
3. *Sukhomlin V.I.* Special boundaries between crystals of ferrite and martensite during decomposition of austenite steel doevtektoidnoy // Book of abstracts "Nanotechnology and nanomaterials" 23-30 August, 2014, - P 111.
4. *Kurdumov G.V. Sachs G*. Über das Mechanismus den Stahlhartung // Zeit. Phys. – 1930. – Vol. 64, – S. 325-329.
5. *Arbusov M.A., Kurdumov G.V.* The orientation of the crystals of cementite in tempered steel//J Technical Physics. 1941.-**11**, vol. 5.– P. 412-416.