초청강연 II

New Hypothesis "Exhaustion of Diffusion-Contributable Vacancies in Core/Rim Structure"

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TiC core/(Ti,Mo)C rim structure in TiC-Mo_2C-Ni base cermet which is generally prepared by sintering below 1450℃ had been believed to be generated by the solid diffusion of Mo atoms into TiC grains (D.Moskowitz and M.Humenik, Jr.:1966). Afterward, it was clarified that the core/rim structure is generated by solution/re-precipitation mechanism : (1) Mo_2C grains and small TiC grains dissolve into the Ni liquid, (2) the dissolved Mo, Ti and C atoms migrate to the surface of TiC coarse grains, (3) the Mo, Ti and C precipitate on the surface of TiC coarse grains and form (Ti,Mo)C solid solution rim, and (4) the Ostwald ripening (grain growth by solution/re-precipitation mechanism) of TiC-core/(Ti,Mo)-rim grains continues, and thus the width of (Ti,Mo)C rim (at the same time, the grain size) increases with sintering time, etc. (H.Suzuki, K.Hayashi and O.Terada: 1973). The TiC-core was found not to disappear even by sintering at 1900℃(ibid.:1974)

Recently, FeSi core/Fe_2Si_5-rim structure in Fe-66.7at%Si thermoelectric alloy was found to also hardly shrink and disappear by long heating at an appropriate temperature (1999: M.Tajima and K.hayashi). Then, the authors considered its cause, and clarified experimentally that the disappearance of FeSi-core/Fe_2Si_5-rim structure could be attributed to the exhaustion of diffusion-contributable vacancies in core/rim structure (N.Taniguchi and K.Hayashi:2001). At present, the authors and my coworker are investigating whether the non-disappearance of TiC core can be explained also from the new hypothesis "Exhaustion of diffusion-contributable vacancies in core/rim structure".