침상형페라이트 조직의 미세조직 단위

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Microstructural Unit of Acicular Ferrite

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Abstracts ; Ferritic weld metal consists of various microstructural constituents including acicular ferrite which has been identified as an important microstructure for improving strength and toughness of ferritic weld deposit and well documented to nucleate on nonmetallic inclusions. Morphologically, acicular ferrite microstructure has been described as 'interlocking structure' or 'basket weave structure' following its fine nature of optical microstructure revealed by nital etching solution. However, there has not been a clear definition on the microstructural unit or the effective grain size of acicular ferrite microstructure of ferritic weld metal. In this study, it was focused to characterize the acicular ferrite microstructure in terms of packet structure and to identify the packet size that corresponds to cleavage facet size. For this purpose, two types of packets were defined; 'crystallographic packets' corresponding to sets of neighboring laths sharing the same cleavage facets as being effective grains, and 'morphological packets' as being sheaves of parallel plates which may be observed in a light and scanning electron microscope after suitable metallographic preparation. In the present study, the crystallographic packet size was determined by EBSD, whereas the morphological packets were revealed by electro-etching technique recently developed. EBSD technique also used in order to assess the crystallographic features of acicular ferrite developed in ferritic weld metal.

As a result of this investigation, it was found that the crystallographic packet size (2.12 μm) made with tolerance of 15 deg and higher was well matches with the cleavage facet size (2.06 μm) while the morphological packet size (1.78 μm) was almost equal to the packet size (1.57 μm) made with tolerance of 2 deg and higher.

Key Words : Acucular ferrite, morphological packet, crystallographic packet, cleavage facet size