

反应堆工程

硅对9Cr-1.5WVTa低活化马氏体钢力学性能的影响

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摘要 基于中国正在研究的聚变堆用9Cr-1.5WVTa低活化马氏体钢 (CLAM钢), 研究了添加合金元素硅对CLAM钢力学性能的影响。结果表明, 添加0.2%Si使得CLAM钢的抗拉强度和屈服强度明显提高, 钢的塑性和冲击韧性同时也得到一定提高, 其中, 韧脆转变温度 (DBTT) 由-13 °C降至-30 °C。未添加和添加0.2%Si的CLAM钢均为全马氏体组织, 无δ铁素体存在。硅的添加使得9Cr-1.5WVTaSi钢的晶粒细化, 从而提高了钢的拉伸和冲击性能。

关键词 [硅](#) [低活化马氏体钢](#)[9Cr-1.5WVTa](#) [力学性能](#) [聚变堆](#)

分类号

Effect of Silicon on Mechanical Properties of 9Cr-1.5WVTa Low Activation Martensitic Steel

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Abstract Based on the new Chinese low activation martensitic (CLAM) steel being developed as for fusion reactors, the effect of silicon adding on the mechanical properties of 9Cr-1.5WVTa steels was investigated. The results show that adding 0.2% silicon leads to higher tensile strength, and more excellent plasticity and impact toughness. The ductile-brittle transition temperature (DBTT) is decreased from -13 °C to -30 °C. The 9Cr-1.5WVTaSi steel has a smaller prior-austenite grain size, but microstructures are similar, both fully martensitic steels free of δ-ferrite. It was summarized that the improved tensile and impact properties of the 9Cr-1.5WVTaSi steel were attributed to adding 0.2% silicon, refined the prior-austenite grain size.

Key words [silicon](#) [low](#) [activation](#) [martensitic](#) [steel](#) [9Cr-1.5WVTa](#) [mechanical](#) [property](#) [fusion](#) [reactor](#)

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