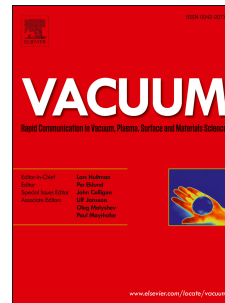


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Influence of yttrium and vacuum degree on the purification of K417 superalloyWei-dong Bian^a, Hua-rui Zhang^{a*}, Ming Gao^a, Qing-ling Li^a, Jin-peng Li^a, Tong-xiang Tao^b, Hu Zhang^{a*}^a School of Materials Science and Engineering, Beihang University, Beijing 100191, China^b Qingdao Institute of New Material technology of Beihang University, Qingdao 266000, China

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Abstract: K417 superalloy castings with different addition of rare earth element Y were produced by vacuum induction melting technology using Y_2O_3 crucibles under different vacuum degrees. The effects and interaction mechanisms of Y and vacuum degree on the purification of the superalloy were investigated. The results showed that high purification of K417 superalloy with 4~5ppm O and N was obtained after addition of Y. There was a characteristic transition during the deoxidation and denitrogenation of the superalloy when the vacuum degree changed. With the addition of 0.5wt% Y in the alloy, the concentration of O could be reduced from 34ppm to 8ppm in rough vacuum and from 13ppm to 4ppm in high vacuum, respectively. High vacuum enhanced the chemical dissolution of Y_2O_3 crucible. The concentration of N decreased from 43ppm to 14ppm with the addition of Y in rough vacuum condition of 100Pa. Whereas, in high vacuum condition of 0.035Pa, the concentration of N tend to increase from 4ppm to 7ppm. The effect of deoxidation of Y promoted the process of denitrogenation.

Keywords: yttrium; vacuum degree; deoxidation; denitrogenation; Y_2O_3 crucibles; superalloy

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