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**Micro-alloying effects of yttrium on the microstructure and strength of silicon
carbide joint brazed with chromium-silicon eutectic alloy**

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Abstract: With the purpose of increasing the joint strength by refining the grain size of CrSi₂ and increasing the fraction of Si-CrSi₂ eutectic, the authors studied the effect of yttrium (Y) on the microstructure and mechanical property of SiC joints brazed with Si-29 wt.% Cr eutectic alloy with varying Y contents (0–1.0 wt.% Y). It was found that adding of appropriate content of Y (<0.1 wt.%) could refine the grain size of CrSi₂ phase and increase the fraction of eutectic region. However, excess addition of 0.5 or 1.0 wt.% Y caused the coarsening of CrSi₂ phase with the formation of irregular shape Y-Si-rich silicide. The SiC joint brazed with alloy added with 0.1 wt.% Y exhibited shear strength, which was improved approximately 20% in comparison with that without Y. Both the fine size of CrSi₂ phase and high fraction of Si-CrSi₂ eutectic contributed to the high strength of SiC joint. Interface between the SiC and brazing alloy exhibits a good chemical adhesion without detectable interdiffusion or the formation of reaction phases.

Keywords: Ceramic; Si-Cr eutectic alloy; Joining; Micro-alloying; Microstructure

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