Effect of Ti content on microstructure and strength of the self-joining of ZrB₂–SiC with Pd–Co–Ti filler metals
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ABSTRACT
Ti element has been introduced into Pd–Co brazing alloy for the joining of SiC reinforced ZrB₂ ceramic. Effects of Ti content on the microstructure and mechanical properties of the joint were investigated. The results showed that, compared with single Pd–Co brazing alloy, by adding Ti element into the brazing alloy, the wettability of brazing alloy on ZrB₂–SiC was greatly improved. The thickness of the diffusion zone in the ceramic occurred a reduction significantly. The active Ti atoms reacted with ZrB₂ to form a TiB₂ layer on the surface of the ceramic. The TiB₂ layer acted as a barrier, the diffusion of the Si from the ceramic to the brazing foil was inhibited. A certain degree of control over the reaction between the solider and SiC was obtained, which was beneficial for the joint strength. The four-point bending strength was 35% higher than the joint brazed with single Pd–Co foil when 10 at.% Ti was added.

KEYWORDS: ZrB₂–SiC, Pd–Co–Ti, brazing, microstructure, mechanical properties