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**Preparation and corrosion resistance of cordierite–spodumene composite
ceramics using zircon as a modifying agent**

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Abstract

To prolong the service life of cordierite–spodumene composite ceramics applied to the solar heat transmission pipeline, the zircon modifier was introduced to improve the corrosion resistance of the ceramics. The effects of zircon on the density, bending strength, crystalline phase, microstructure and chemical stability were studied. The results showed that the sintering temperature range of the composite ceramics was broadened to 40–60 °C with the introduction of 5–15 wt% zircon. Moreover, the mechanical strength and corrosion resistance of the ceramic materials were improved with the zircon introduction. In particular, sample C3 containing 15 wt% of zircon and sintered at 1360 °C exhibited the best performance, which had the 0.03% Wa, 0.07% Pa, 2.34 g·cm⁻³ Db and 100.17 MPa bending strength. After acid and alkali corrosion, the water absorption was still less than 0.5% and the strength loss rate decreased to less than 5.3%. The XRD and SEM analyses demonstrated that the ZrSiO₄ grains dispersed at the grain boundaries could enhance the mechanical properties. Furthermore, the existence of the Zr⁴⁺ ions not only reduced the cationic

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