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**A self-healing strategy for inorganic fillers: Toward practical applications of silicone resin treated at high temperatures for bonding ceramic joints**

Lege Wang, You-Fen Li\*, Shi-Hai You, Liangliang Sun, Yaoyao Tong

Beijing Key Laboratory of Electrochemical Process and Technology for Materials, Beijing

University of Chemical Technology, Beijing 100029, P.R. China

\*Corresponding authors. College of Materials Science and Engineering, Beijing University of Chemical Technology, 15 Beisanhuan East Rd., Chaoyang District, Beijing 100029, P.R. China. Fax: +86 10 64436736. E-mail addresses: yfli@mail.buct.edu.cn (You-Fen Li).

**Abstract**

A high-temperature adhesive composed of a silicone resin (SR) matrix was prepared for bonding ceramic joints. The adhesive primarily consists of boehmite sol as the modifier and B<sub>4</sub>C, Al and fumed SiO<sub>2</sub> powders as inorganic fillers. In this study, the ceramic yield of the adhesive was determined to reach 138 % after heat treatment at 1100 °C. The bonding strength of ceramic joints heated at 200 °C was measured as 6.25 MPa and increased to 41.67 MPa after heat treatment at 1000 °C. According to mechanistic analysis, the volume shrinkage induced by the pyrolysis of SR was effectively restrained, and the micro-pores and cracks resulting from the oxidation process of the inorganic fillers can be self-healed by introducing borate. In addition, chemical bonds were introduced at the interfaces, thereby further improving the adhesive strength at elevated temperatures.

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