Journal of the Australian Ceramic Society
Volume 53 | Issue 2 | May 2017 | ISSN: 2321-7782

High alumina castables: A comparison among various sol-gel bonding systems

Akhilesh Kumar Singh[1], Ritwik Sarkar[2]
[1]Applied Science, Parul University, Vadodara, India
[2]NITR · Department of Ceramic Engineering (CR), National Institute of Technology Rourkela

Abstract:
A comparison among various sol-gel bonding systems has been done for high alumina castable refractory. Four different sol systems, namely alumina, boehmite, mullite and spinel, have been synthesized and used individually as sole binder in high alumina castable system with particle size distribution coefficient of 0.23 as per Dinger and Funk model. The castable compositions were processed conventionally and properties were evaluated after heat treatment at different temperatures. These developed sol containing compositions were also compared against commercially available silica sol containing composition prepared under exactly similar conditions. Mullite sol bonded composition showed higher cold strength, whereas spinel sol resulted in better hot properties. Improved thermal shock resistance against commercial sol binder was observed in spinel and mullite sol containing compositions, may be associated with the micro-cracking effect produced from the thermal expansion mismatch. The slag corrosion resistance was also observed better for the spinel sol containing composition. The commercial silica sol bonded compositions showed higher strength due to its higher solid content but resulted in inferior hot and corrosion properties.

Link:
https://www.researchgate.net/publication/316618396_High_alumina_castables_A_comparison_among_various_sol-gel_bonding_systems