

EFFECTS OF ENVIRONMENT pH ON SLOW CRACK
GROWTH IN PORCELAIN CERAMICS

S.M.S. Abeywera and B.S.B. Karunaratne
Dept. of Physics, University of Peradeniya.

Propagation of slow cracks in brittle materials during the service, plays a major role in reducing the life time of the material components. It is well known that the slow crack growth rate is affected by the environmental conditions close to the tip. The work presented in this communication is concentrated on studying the effects of environment pH on slow crack growth in porcelain ceramics. To obtain slow crack growth data, double-torsion (DT) technique was used and the measurements were carried out in air, in water and in solutions having different pH values between 3 and 11.5. The DT specimen is a rectangular plate with a groove at the middle parallel to the length of the specimen. This groove was made to ensure crack propagation in a direction parallel to the specimen length. In this investigation the dependence of crack velocity (V) on the stress intensity factor (K_1) at the crack tip was investigated. The value of K_1 was calculated using a relationship between K_1 and geometrical parameters of the specimen and the elastic constants of the material. The crack velocity was measured by directly monitoring the crack tip optically.

The investigations revealed that the slow crack growth in porcelain is enhanced by humid environments. It is also found that the slow crack growth in porcelain ceramics was increased as the concentration of OH^- ions in the solution was increased.

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