FRICION REDUCTION BY ADDING COPPER OXIDE INTO ALUMINA AND ZIRCONIA CERAMICS

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The friction and wear of alumina and zirconia ceramics doped with various weight percentages (0.5% wt, 1% wt and 5% wt) of CuO was studied. Dry sliding tests by using a pin-on-disc tribotester were conducted on these materials against commercially available Al₂O₃, ZrO₂, SiC, and Si₃N₄ ceramic balls.

The results show that CuO give a significant reduction of friction only when the alumina and zirconia doped with CuO were sliding against Al₂O₃ balls. The coefficient of friction of CuO doped in alumina sliding against Al₂O₃ balls reduces from 0.7 to 0.4 and hardly depends on the normal load and the velocity. On the other hand, CuO doped in zirconia can reduce the coefficient of friction (when sliding against Al₂O₃ balls) from 0.8 to a value of about 0.2 and 0.3 depending on the normal load.

SEM pictures taken from the wear track showed that smooth patchy layers were formed. These smooth patchy layers, which carry the normal load, are responsible in reducing the coefficient of friction.

Keywords: Ceramics, CuO, low friction