



## Toughness and dielectric behavior of Polycrystalline alumina

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### Abstract

Different alumina materials were elaborated in order to vary micro structural parameters (grains size, densification, porosity, intergranular phase). These ceramic materials were then characterized from the mechanical point of view (hardness, toughness, friction and wear) and dielectric breakdown. The comparison of these various results shows that for all these properties, the grain size and, thus also, nature of the secondary phases are the most discriminating microstructural parameters.

Moreover from the tribological point of view, the dielectric characteristic of materials (breakdown strength) has a fundamental role on the creation of the third body and the properties of this last: a finely agglomerated third body will be obtained for high breakdown strength. Such third will be able to protect the substrate and thus to reduce later wear. In samellogic a correspondence between breakdown strength and toughness was established, thus confirming the mechanics-electric correlation existing for the non-conductive materials.

### REFERENCES

1. Zé, Parfait & Tsamo, Cornelius & Kamga, Richard. (2018). Characterization of Minim-Martap Bauxite and Its Extracted Alumina. *Journal of Advanced Chemical Sciences*. 4. 598–600. 10.30799/jacs.198.18040402.

2. Tsamo, Cornelius & Tchouanyo, D & Meali, D. (2017). Treatment of Red Mud with Distilled Water to Improve Its Efficiency to Remove Methylene Blue from Aqueous Solution. *International Research Journal of Pure and Applied Chemistry*. 15. 1-19. 10.9734/IRJPAC/2017/37714.

3. Tsamo, Cornelius & Djonga, P. & Dangwang Dikdim, Jean Marie & Kamga, Richard. (2017). Kinetic and Equilibrium Studies of Cr(VI), Cu(II) and Pb(II) Removal from Aqueous Solution Using Red Mud, a Low-Cost Adsorbent. *Arabian Journal for Science and Engineering*. 43. 10.1007/s13369-017-2787-5.

4. Munishwar, Sudhirkumar & Pawar, Pravin & Ughade, Suresh & Gedam, Rupesh. (2017). Size dependent effect of electron-hole recombination of CdS quantum dots on emission of Dy 3+ ions in borosilicate glasses through energy transfer. *Journal of Alloys and Compounds*. 725. 10.1016/j.jallcom.2017.07.146.

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