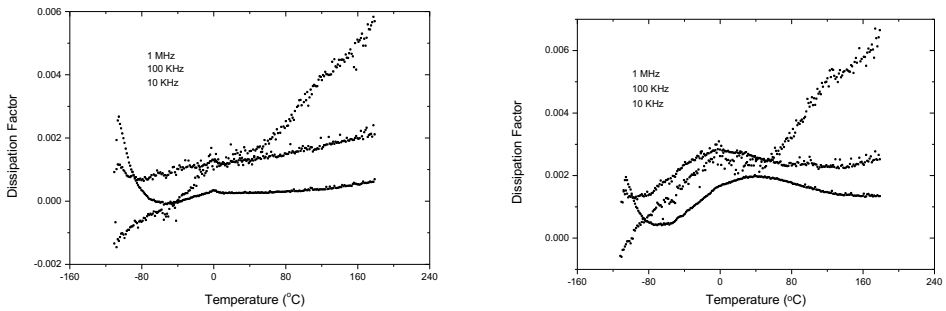
Interface Diffusion of Silver Electrode into Bismuth-based Ceramics and its Effects on the Dielectric Properties

Xiukai Cai*, Xiaobo Sun, Lufeng Pang
College of Civil Engineering, Shandong Jianzhu University, Jinan 250101, China;
Xiukai Cai: xkcai@sdjzu.edu.cn

Co-fired multi-player ceramic capacitors sintered at lower temperatures than the melting point of silver, are required to have excellent reliabilities. So the interface behaviors between bismuth-based dielectrics and Ag or Ag-Pd admixture, have been attracted wide attention. Now it was found that the bismuth-based dielectric ceramics possess a tendency of deteriorated properties towards higher silver-fired temperatures, as illustrated in Fig. 1 (a) and (b). The silver's distributions in the vicinity of the interface layer quantitatively determined by electron probe and scanning electron microscopy with EDS spectrum, shown in Fig. 2, the silver in the right margin has been diffused into the inner the left dielectric layer, so an reasonable explanation has been found.



(a) (b)

Fig. 1: Dissipation factors Vs temperature of bismuth-based ceramics silver-fired at 860℃(a)and 920℃(b)

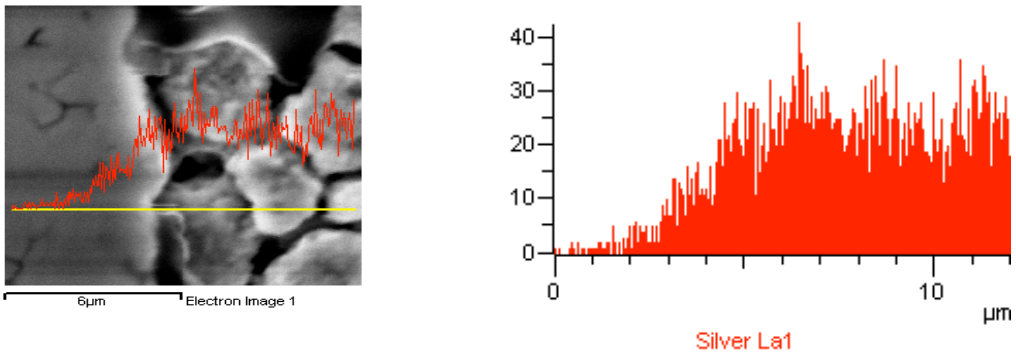


Fig. 2: Line distribution of characteristic X-ray intensities for bismuth-based dielectrics silver-fired at 920℃