Possible two non-linear regions in the IeV characteristics of ZnO varistors

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Abstract:

We report here structural and IeV characteristics of ZnO varistor with Fe2O3 nanoparticles additions (200 nm). It was found that the addition of Fe does not influence the wurtzite structure of ZnO ceramics, while the average grain size was affected. Interestingly, the nonlinear region was clearly observed in the IeV characteristics of the samples with Fe \( \frac{\text{Fe}}{\text{ZnO}} \) 2.5%, 5% and 10%. Whereas, two nonlinear regions were only observed with further increase of Fe addition above 10% (30% and 50%). Although the values of non-linear coefficient are decreased by the additions of Fe, the breakdown field could be increased up to 7900 V/cm. Furthermore, the electrical conductivity was improved by increasing Fe up to 10%, followed by a decrease with further increase of Fe up to 50%. These results were discussed in terms of Fe2O3 nanosize grains which were formed and localized at the grain boundaries of ZnO ceramics.

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