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微波烧结氧化锌压敏电阻的致密化和晶粒生长

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摘要 研究了微波烧结的ZnO压敏电阻的致密化和生长动力学, 微波烧结温度从900～1200℃, 保温时间从20min～2h. 研究表明, 微波烧结ZnO压敏电阻的物相组成和传统烧结的样品没有区别; 微波烧结有助于样品的致密化, 并降低致密化温度. 随着烧结温度的升高, 致密化和反致密化作用共同影响样品的密度, 其中Bi的挥发是主要影响因素. 微波烧结ZnO压敏电阻的晶粒生长动力学指数为2.9～3.4, 生长激活能为225kJ/mol, 传统烧结的ZnO压敏电阻的晶粒生长动力学指数为3.6～4.2, 生长激活能为363kJ/mol. 液相Bi_2O_3、尖晶石相和微波的“非热效应”是影响微波烧结ZnO压敏电阻陶瓷晶粒生长的主要因素.

关键词 微波烧结 氧化锌压敏电阻 致密化 晶粒生长动力学

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Densification and Grain Growth of Microwave Sintered ZnO Varistors

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Abstract The densification and grain growth kinetics of microwave and conventional sintered ZnO varistors were studied. It reveals that there are no differences in the components of microwave and conventional sintered samples. Microwave is beneficial to the densification and can lower down the sintering temperature. Both densification and anti-densification processes affect the densities of the final products and the evaporation of Bi component is the main cause. The grain growth exponent values (n) are 2.9--3.4 for the ZnO varistor sintered by microwave, and lower than the ones of conventional sintered samples. And the apparent activation energies (Q) of microwave and conventional sintered ZnO varistors are 225 and 363kJ/mol, respectively. Bi_2O_3 liquid phase, spinel phase and the ''nonthermal effect'' of microwave are the main factors to co-influent the grain growth of microwave sintered ZnO varistors.

Key words microwave sintering zinc oxide varistor densification grain growth kinetics

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