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Self-growth of nanocrystalline structures for amorphous**Sr_{0.925}Bi_{0.05}TiO₃ thin films with high energy density**Qiuxia Li^a, Wenbin Gao^b, Zhen Su^a, Manwen Yao^{a,*}, Xi Yao^a

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Abstract: Process of self-growth nanocrystalline structure was explored to improve the dielectric properties of amorphous Sr_{0.925}Bi_{0.05}TiO₃ (SBT) thin films through controlling the annealing temperature. The crystallinity of the material was only 15% when annealed at 550 °C, and the resulting nanocrystalline particles were 14 nm in size as determined by XRD analysis. Therefore, the proposed process could produce a novel film of an amorphous matrix coating nanocrystalline particles. Finite element analysis results showed that the applied electric field was focused primarily in the amorphous matrix, which could effectively decrease the probability of low voltage breakdown of the nanocrystalline particles. Simultaneously, the nanocrystalline particles supplied more polarization charges, which helped to improve the dielectric constant of the inorganic composite. Combining the merits of amorphous and crystalline phases, the ultimate energy storage density of the modified sample was as high as 21.2 J/cm³, which represents an improvement of 5.1 J/cm³ compared with that

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