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Discovery of strain glass transition in non-metallic ferroelastic PEI ZHANG, DEZHEN XUE, XIAOBING REN, MMRC, Frontier Institute of Science and Technology, Xi'an Jiaotong University, China, MMRC, FRONTIER INSTITUTE OF SCIENCE AND TECHNOLOGY, XI'AN JIAOTONG UNIVERSITY, CHINA TEAM, FERROIC PHYSICS GROUP, NATIONAL INSTITUTE FOR MATERIALS SCIENCE, TSUKUBA 305-0047, JAPAN COLLABORATION — Strain glass, a glassy state of lattice strain, has been identified in alloys with shuffle being the principle order parameter and strain being the secondary order parameter. However, it is well known that many non-metallic ferroelastic systems possess long range order with tilt being the first order parameter. But the existence of the glassy state of such strain caused by tilt remains unclear. In the present study, we report that the strain glass indeed exists in the non-metallic ferroelastic material, a Sr and Nb co-doped $LaAlO_3$ system, with randomly frozen tilt strain local order. With increasing defect concentration x in $La_{1-x}Sr_xAl_{0.95}Nb_{0.05}O_3$, the martensitic transition is gradually suppressed and finally strain glass transition occurs. The glassy transition is characterized by a typical frequency dispersion of modulus, a broken of ergodicity for static strain, as well as the formation of nano-domains with R local structure. Due to the strong local barrier caused by the randomly distributed point defects, the ideal freezing temperature T_0 of strain glass in this system increases with defect concentration, which can be well understood by a modified Landau free energy landscape.

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