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Professor Ji Young Jo's research team identifies the phenomenon of ferroelastic domain switching within a nanosecond

□ GIST (President Kiseon Kim) School of Materials Science and Engineering Professor Ji Young Jo's research team succeeded in observing the dipole orientation of the ferroelastic * domain switching in a ferroelectric ** thin film layer within nanoseconds ***.

- This research results are expected to greatly contribute to research on gigahertz electronic devices based on ferroelectric materials such as nonvolatile computer RAM memory.

* ferroelastic: The material becomes spontaneously taut when a phase transition occurs in which a substance changes from one crystal state to another. Shape memory and superelastic phenomena in nickel and titanium alloys are typical examples.

** ferroelectric: A material that has its own polarization without an external electric field. It refers to a material whose direction of polarization can be switched by an external electric field.

*** nanosecond: a very small unit of time equal to one billionth of a second

□ Ferroelectric domain configuration and domain reversal by electric field application are directly related to the operation speed of the electric element of the ferroelectric thin film. However, existing ferroelectric thin films have relatively slow response speeds (tens of microseconds) and require breakthroughs for faster devices.

- The research team used a newly developed ultrafast X-ray structural analysis (time resolved micro X-ray diffraction) to form a nanoelastically rigid area the size of a nanometer on Pb (Zr_{0.35}, Ti_{0.65}) O₃ thin film capacitors. Ultrafast reversal is possible and the switching time is inversely proportional to the magnitude of the applied electric field and the polarization reversal is completed in a very short time of about 7 nanoseconds.

- Professor Ji Young Jo said, "Through this research, we contributed to the development of multiple signal devices using the characteristics of ferroelectricity that change over time. It is expected to be used in semiconductor devices such as random access memory (RAM) or field effect transistor (FET) requiring high performance."

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