

## Formation of high-k dielectrics with high permittivity as a gate dielectric by ion-plasma methods

### Project key goals:

- Develop a method for the RF magnetron formation of ferroelectric thin-film layers,
- Study their ferroelectric and piezoelectric properties for use in memory elements and dynamic deformation sensors

### Theoretical base:

The sensors use a direct piezoelectric effect – the occurrence of electrostatic charges in the ferroelectric under the influence of mechanical stresses. The resulting charge is proportional to the mechanical stress and changes sign with it and disappears after the stress is removed. The low weight, high mechanical strength and flexibility of the film transducers make it possible to control surfaces of time-varying curvature under conditions of high mechanical loads without introducing distortions in the recorded deformation.

The use of thin ferroelectric films in ferroelectric non-volatile memory with random access to cells (Ferroelectric Random Access non-volatile Memory, FRAM or FeRAM) is relevant. One of the key elements in FRAM technology is the production of ferroelectric films. As materials of ferroelectric layers, the most common layers are based on PZT (Lead zirconate titanate) with the general formula  $Pb(Zr_xTi_{1-x})O_3$  and SBT (strontium bismuth tantalate),  $SrBi_2Ta_2O_9$ , often doped with niobium.

### Type of collaboration

research cooperation

### Key words

high-k, dielectrics,  
sensor, ion-plasma

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