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## **Special Lecture in Materials**

**MRS**

The Laboratory  
for Research on  
the Structure  
of Matter

### ***From Lead Zirconate to PZT: Evolution of Structure***

**Sergey B. Vakhrushev**

Ioffe Institute and  
St. Petersburg State Polytechnical University  
Saint Petersburg, Russia

**Friday, January 23, 2:30 pm**

**Reading Room**

**Laboratory for Research on the Structure of Matter  
University of Pennsylvania  
3231 Walnut Street, Philadelphia, PA 19104**

The oxide solid solutions  $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$  have been the backbone of actuators and sensors for the past half century, because they are strong piezoelectrics, interconverting voltages and shape changes. The alloying of Ti with Zr provides strong polar character as well as disorder, making the dipoles ultrasensitive to external pressure, temperature and electric fields. We use X-ray diffraction and inelastic X-ray scattering to explore structural changes as well as dynamical motions of atoms underlying piezoelectric response. By studying a family of  $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$  solutions with different Ti:Zr ratios at different temperatures, new insights are discovered about the physics underlying this important family of smart materials.

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