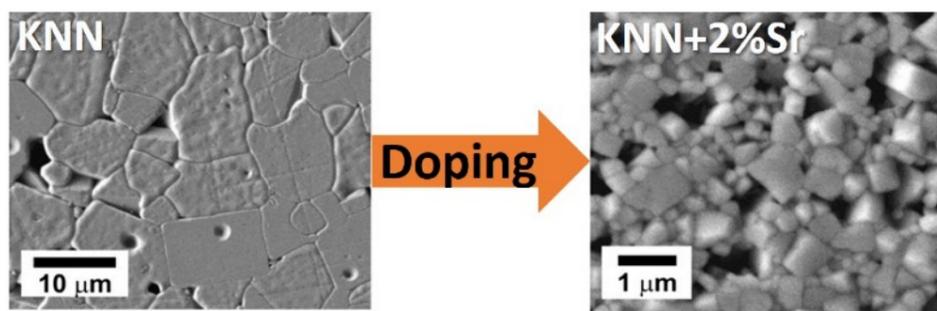


TUESDAY
10
MARCH



SEMINAR
GREMAN

Barbara MALIC

Jožef Stefan Institute - Ljubljana, Slovenia



Synthesis–Sintering–Microstructure– Properties Relations in Sodium-Potassium- Niobate-Based Piezoelectric Ceramics

🕒 11:00am - 12:00am 📍 Amphi 2 - IUT de Blois - Chocolaterie site

Concerns about health and environmental issues, supported by legislation, have spurred research on lead-free materials that could replace highly efficient lead-based perovskite oxides with excellent ferroelectric, relaxor ferroelectric, antiferroelectric, and/or piezoelectric properties. The scientific community has identified a number of lead-free formulations based on compounds or solid solutions already studied in the mid-20th century: sodium bismuth titanate ($\text{Na}^{0.5}\text{Bi}^{0.5}\text{TiO}_3$, NBT), barium titanate (BaTiO_3 , BT), and potassium sodium niobate ($\text{K}^{0.5}\text{Na}^{0.5}\text{NbO}_3$, KNN). Saito et al. (Nature, 432, 84, 2004) were the first to report the piezoelectric properties of $(\text{K},\text{Na},\text{Li})(\text{Nb},\text{Ta},\text{Sb})\text{O}_3$ ceramic comparable to those of morphotropic-phase-boundary $\text{Pb}(\text{Zr},\text{Ti})\text{O}_3$ (PZT) ceramics.

Strategies developed to boost the functional response of lead-based perovskites have been transferred to lead-free alternatives, including chemical modification (doping) and phase-boundary engineering. Such approaches result in material chemistries in which cations of different sizes and charges occupy the same sublattice sites. Even seemingly minor changes in processing, such as the sequence of reagent additions, can alter the phase composition and microstructural details and, consequently, influence the piezoelectric properties. KNN has been notorious for its poor sinterability and narrow sintering range, while complex KNN-based ceramics usually densify well. However, the ability to design the microstructure of the latter remains a challenge.

The contribution discusses how the chemical composition, synthesis, and processing details influence the phase composition, microstructure, and structure in KNN-based materials and, consequently, their functional response.

📅 Upcoming GREMAN Seminars:

Thursday
26
March

1:30pm - Julien VASSEUR
Journal Club (MTC site)

Thursday
9
April

1:30pm - Thierry LAHAYE
Seminar (EMA site)

Tuesday
28
April

11am - to be defined
Journal Club

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