High $T_c/E_{c}$ PMN-PZT Single Crystals for Piezoelectric Actuator and Transducer Applications:
Bridgman PMN-PT Crystals vs. SSCG PMN-PZT Crystals

Ho-Yong Lee, Sung-Min Lee* and Dong-Ho Kim*
Sunmoon University, Ceracomp Co., Ltd.*

Abstract: Piezoelectric single crystals in the ternary MPB PMN-PZ-PT system with high $T_c$ ($T_c > 200\text{–}300^\circ \text{C}$) and $E_{c}$ ($E_{c}>5\text{–}10 \text{kV/cm}$) were fabricated by the cost-effective solid-state crystal growth (SSCG) technique. Chemically uniform PMN-PZT single crystals were successfully grown up to 60 mm by the SSCG method and their dielectric and piezoelectric properties characterized. Compared to Bridgman PMN-PT single crystals, the high $T_c/E_{c}$ PMN-PZT single crystals were found to exhibit a much wider usage range with respect to electric field as well as temperature, and thus become best candidates for medical transducers, actuators, and naval applications.