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PIEZOELECTRIC THIN FILMS (PZT) DEPOSITED WITH PULSED LASER DEPOSITION (PLD) ON 4- TO 8-INCH WAFERS

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In the past years, the industry has realized the potential of piezoelectric MEMS as smart components for a broad range of IoT applications including actuators, sensors, vibration energy harvesters [1],[2] and transducers for RF applications [3].

PZT ($Pb[Zr_xTi_{1-x}]O_3$) thin films shows one of the highest piezoelectric coefficients among thin film materials. Their use in MEMS sensors and actuators (called piezo-MEMS) is seeing an increasing number of applications reaching commercial maturity. The industry has a strong request for industry-level deposition processes and Pulsed Laser Deposition (PLD) technique has several advantages over competing ones: high throughput, low materials costs, lower deposition temperature and self-poling options.

Here we present the latest results we achieved depositing PZT thin films on 4- to 8-inch wafers using Solmates B.V. (NL) SMP 800 PLD tool installed at EPFL CMI (Lausanne, Switzerland).

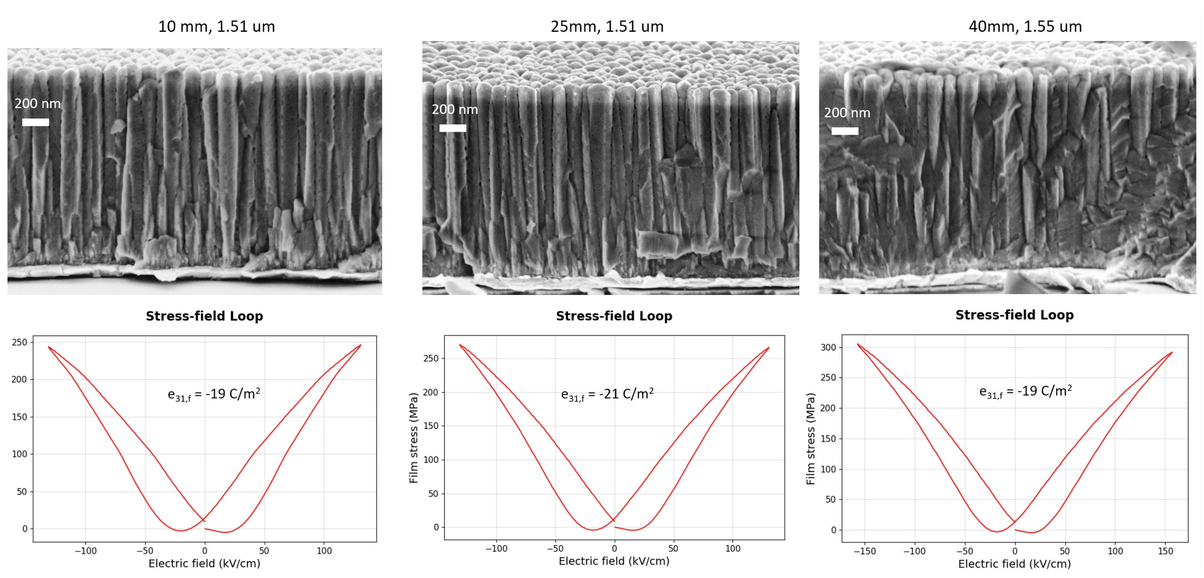

Fig.1: SEM cross section images and effective transverse piezoelectric coefficient of the PZT deposited on 4-inch wafer.

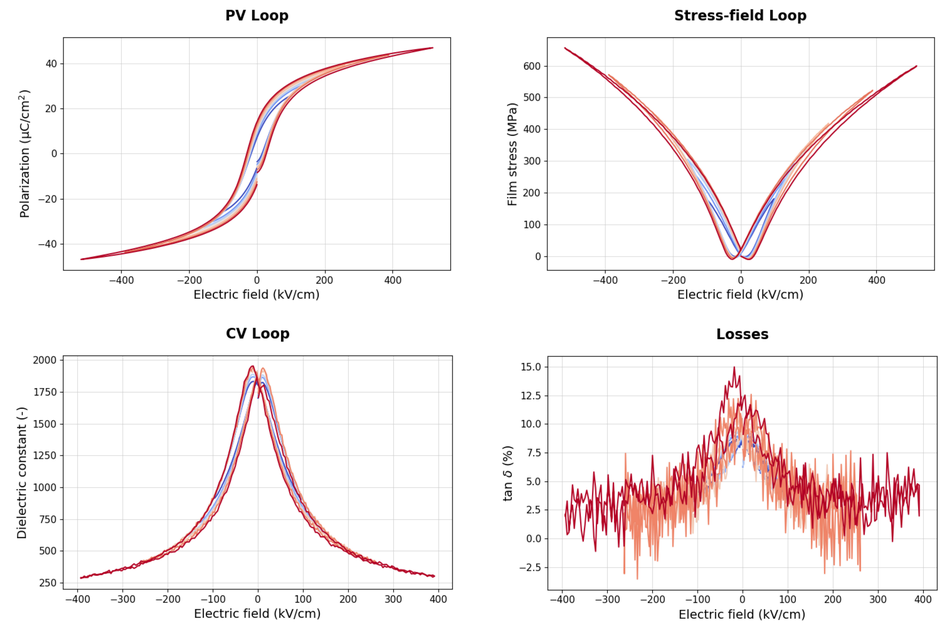

Fig.2: Polarization and stress loops; dielectric permittivity and losses of the PZT deposited on 4-inch wafer.

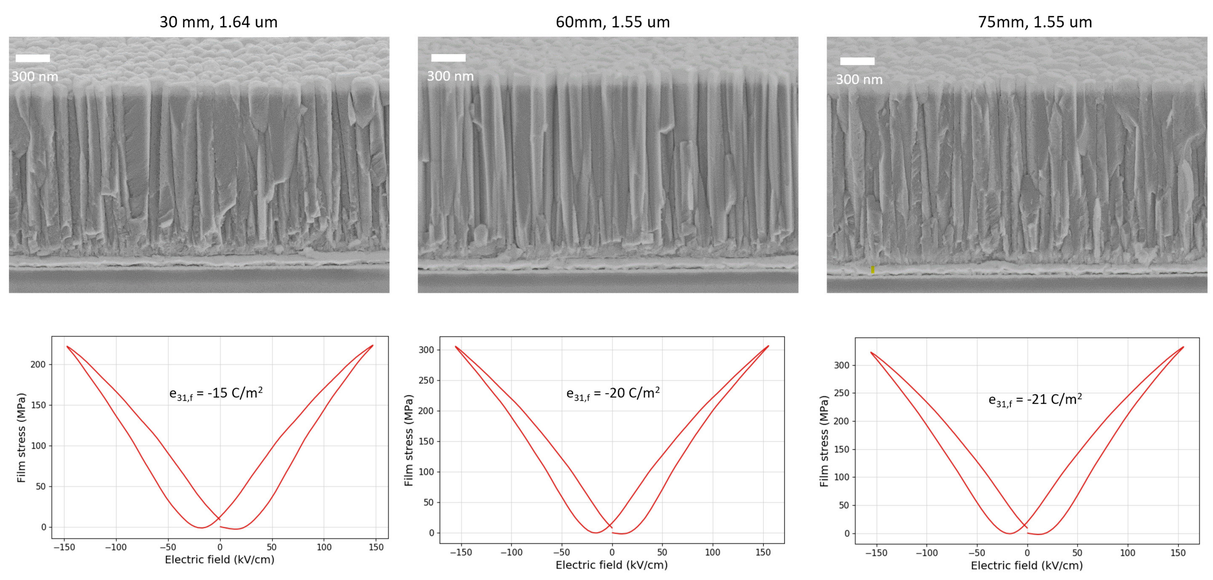

Fig.3: SEM cross section images and effective transverse piezoelectric coefficient of the PZT deposited on 8-inch wafer.

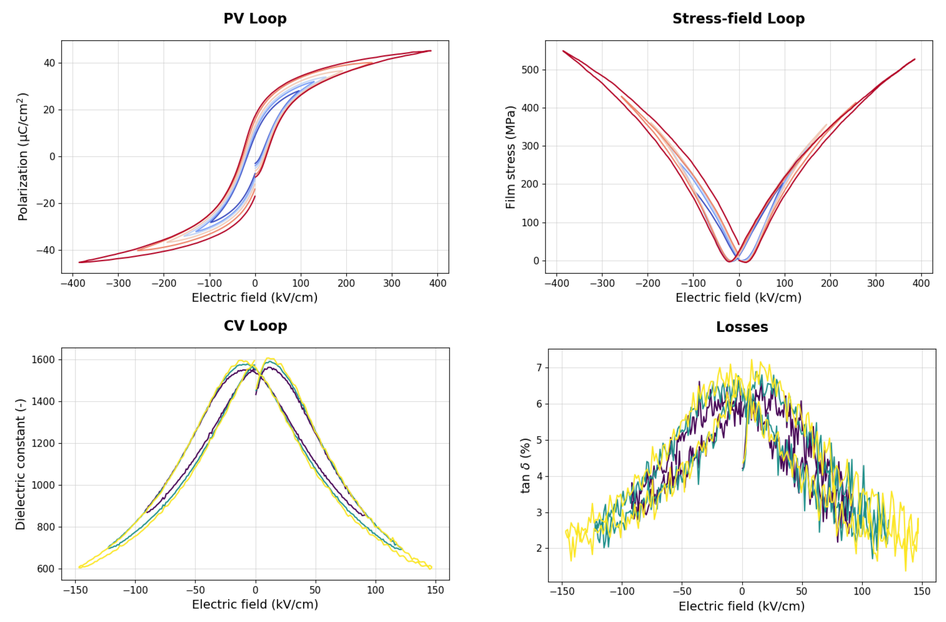

Fig.4: Polarization and stress loops; dielectric permittivity and losses of the PZT deposited on 8-inch wafer.

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