

Motivation:

- ferroelectric films are widely used in the fields of sensors, actuators, capacitors and FRAMs
- currently used deposition methods need an additional patterning process step
- direct patterning of ceramic films by UV-lithography combines deposition and patterning → easy, cheap and cleanroom compatible alternative

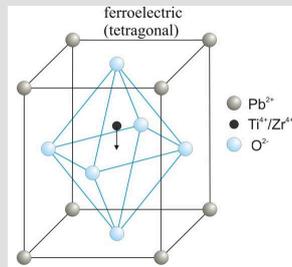


Ferroelectric RAM (FRAM) devices (Fujitsu Semiconductor Europe)

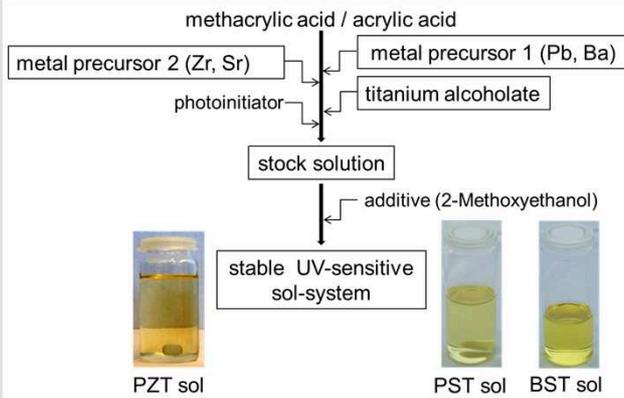
Used Materials:

ferroelectric ceramics with perovskite structure:

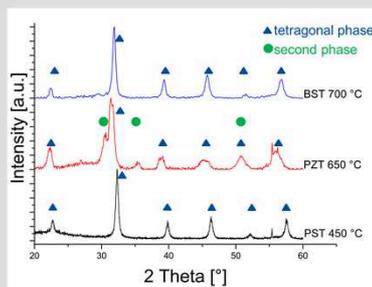
- lead zirconate titanate PZT ✓
- lead strontium titanate PST ✓
- barium strontium titanate BST ✓



Sol synthesis:



Phase analysis:



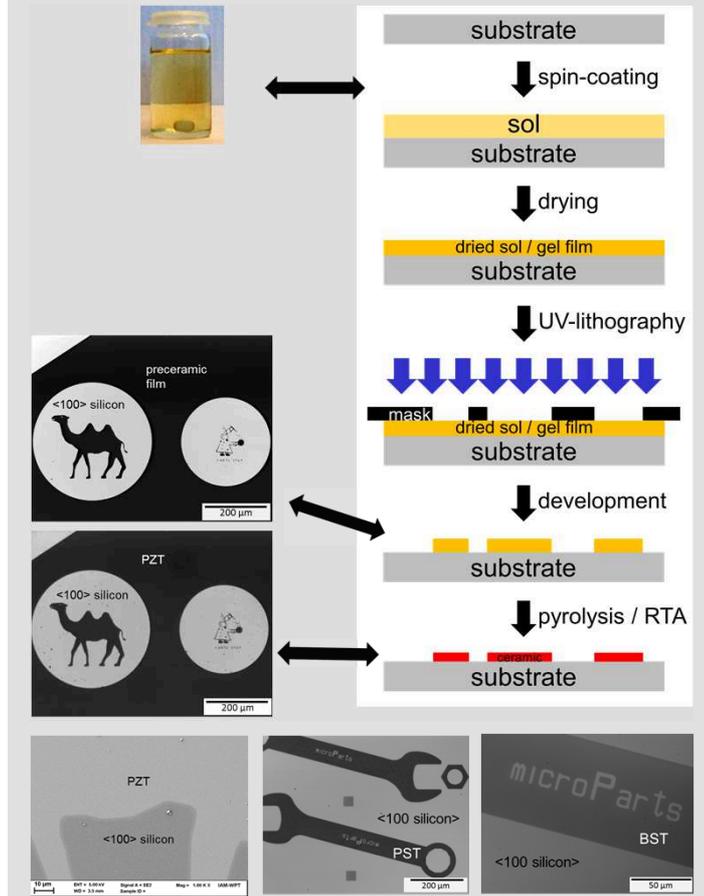
Formation of the desired ferroelectric tetragonal phase (perovskite) at pleasingly low temperatures:

- PST ~ 450 °C
- PZT ~ 650 °C
- BST ~ 700 °C

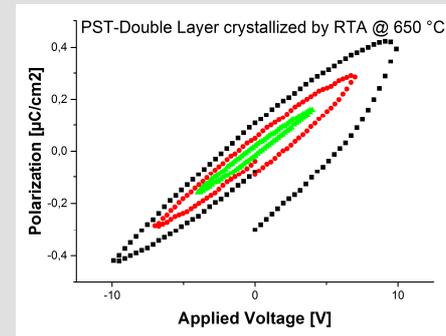
Acknowledgement:

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Ceramic film generation:



Dielectric measurements:



Polarization vs. voltage shows hysteresis behavior
 → proof of ferroelectric properties of the ceramic films

Results:

- micro structured, crack free ceramic thin films
- low defect concentration
- polycrystalline and fine grained
- maximum lateral resolution 1-2 µm
- thickness 30-150 nm
- simple sol synthesis
- sols can be processed like commercial photoresists