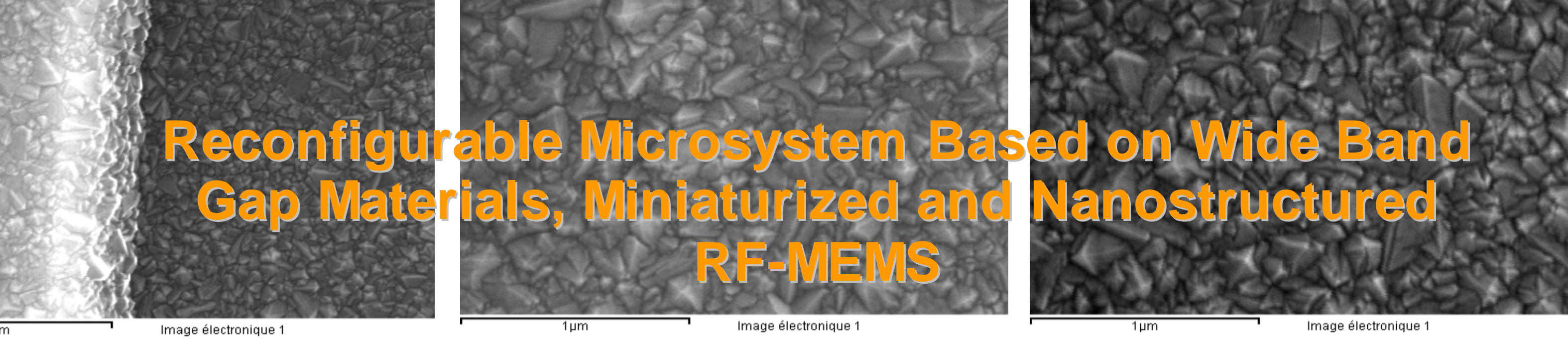
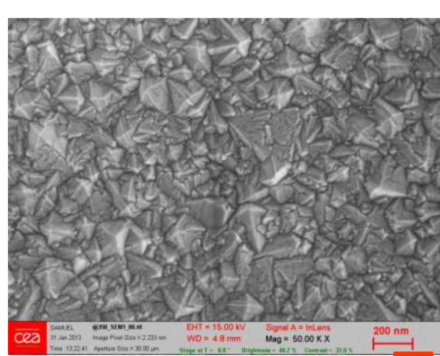


April 2013 **Newsletter #2**

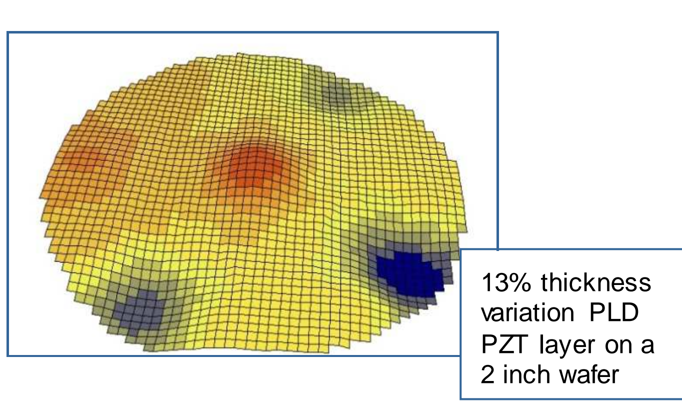
WORK PROGRESS DURING THE 2nd YEAR: KEY ISSUES

WP 2: Nanostructured Dielectric development and integration with MEMS and MiniMEMS

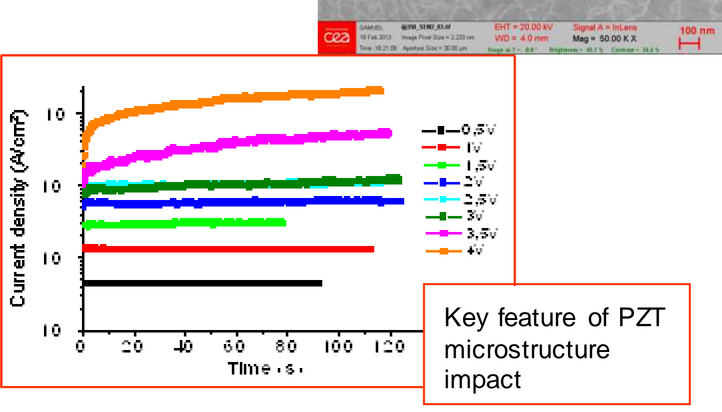


- PLD deposited PZT
  - Technology transfer
  - Homogeneity optimization
  - Roughness study
- Diamond
  - Smoothening process development : RMS 1nm on gold electrodes
  - Smoothening of doped and nanocrystalline layers
  - Electrical characterization : promising results
- CNT impregnated silicon nitride
  - Technological process development
  - CNT growth optimization

Diamond topography after smoothening



13% thickness variation PLD PZT layer on a 2 inch wafer

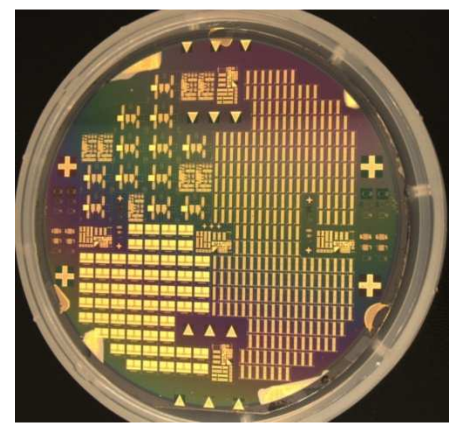


Key feature of PZT microstructure impact

WP 3: Design, Fabrication and Test of GaN, Si and LCP based MEMS and Mini-MEMS switch Capacitors and Phase Shifters

✓ Realization of TiO_2 based RF MEMS on Si and GaN/Si

✓ Power handling up to 10W demonstrated

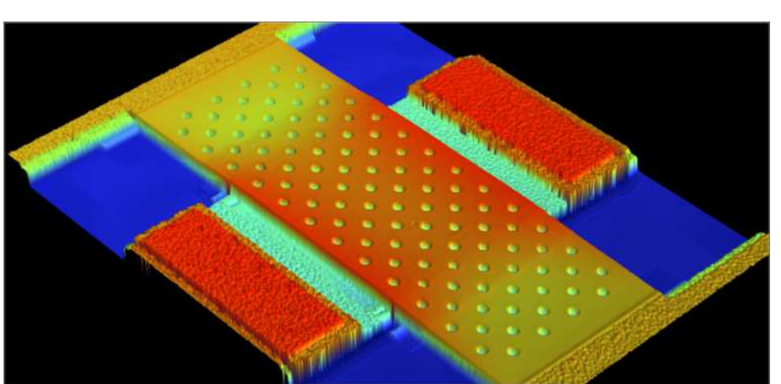


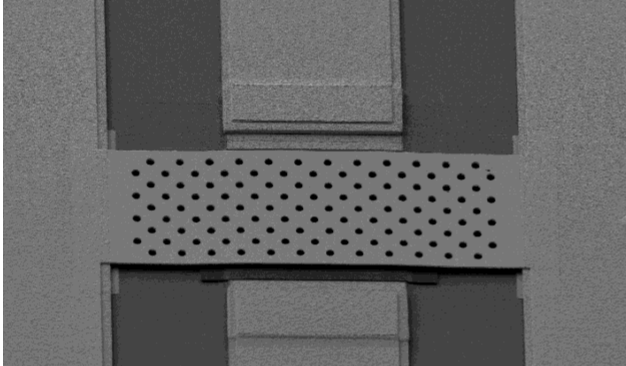
✓ Switching time < 5µs achieved

✓ Switching cycles 10^6 demonstrated

✓ Actuation voltage : < 35V &
Insertion losses: $0.25 dBmm^{-1}$

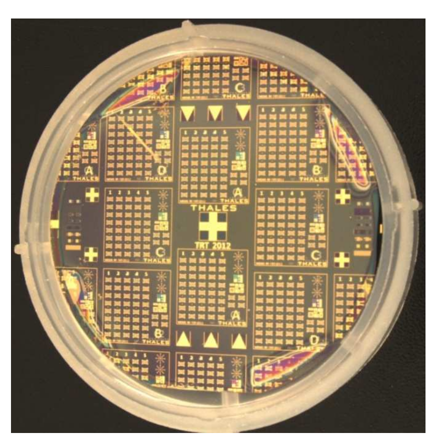
✓ Isolation of 15dB demonstrated

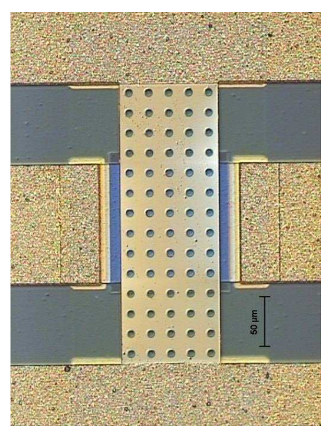




Fabrication run on Si substrate of 200 nm thick PZT/PLD based RF MEMS switches

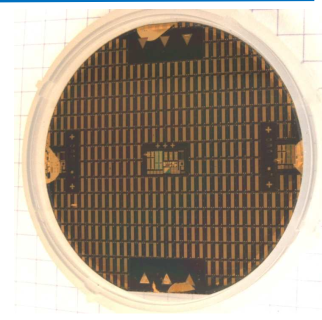
- Technological transfer between IEF & TRT
- 2-inch Si/SiO_2 substrate
- RF characterisation of MEMS in progress

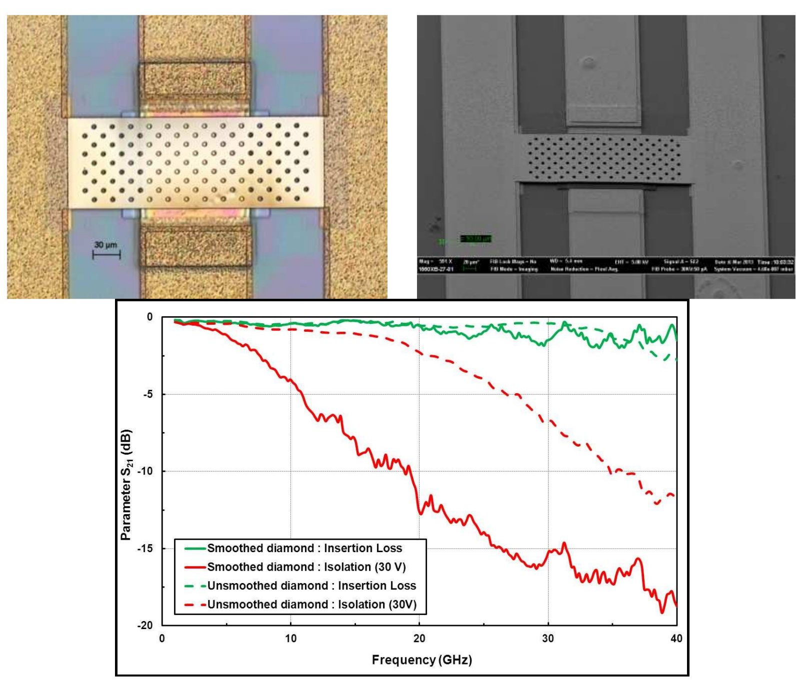




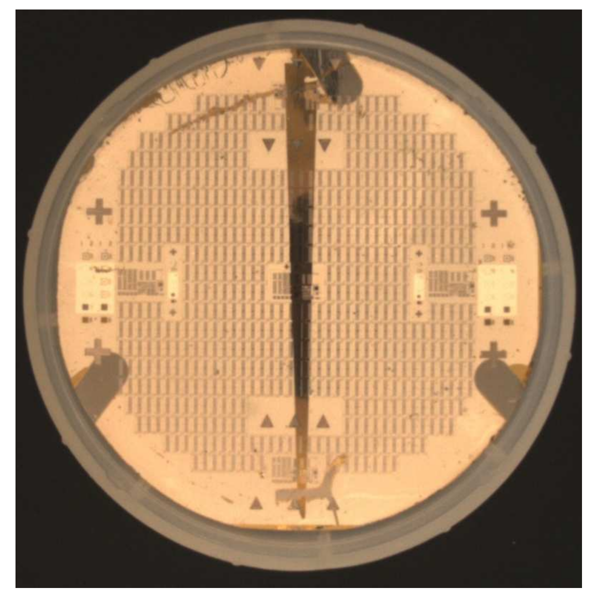
Fabrication run on Si substrate of 300 nm smooth diamond based RF MEMS switches

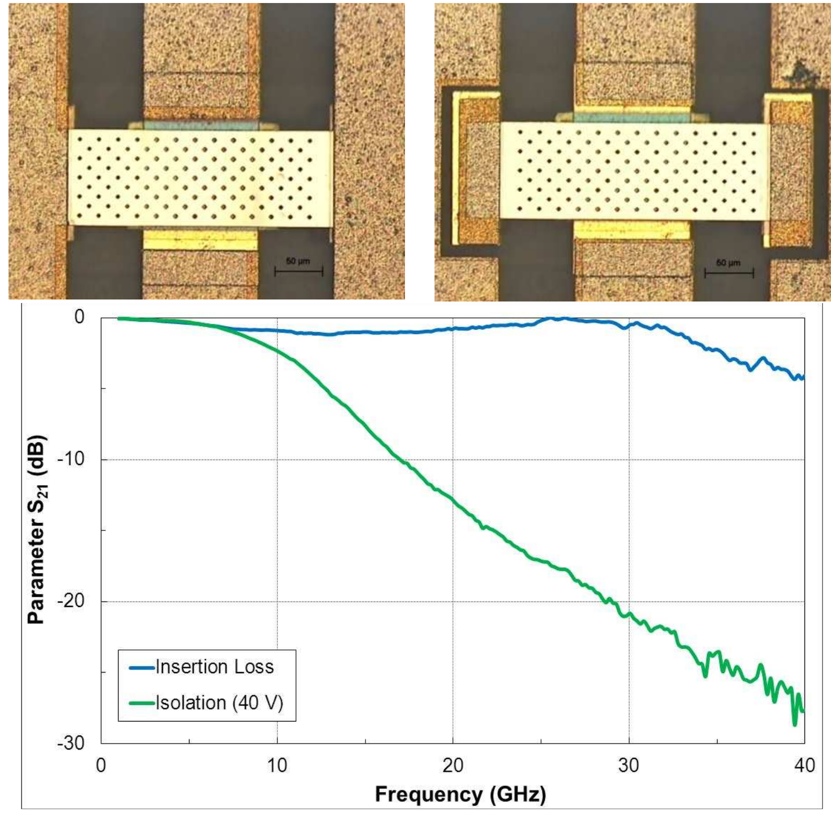
- 2-inch Si/SiO_2 substrate
- 300 nm thick smooth diamond (CEA)
- Improvement of isolation at 10 GHz (-4 dB)





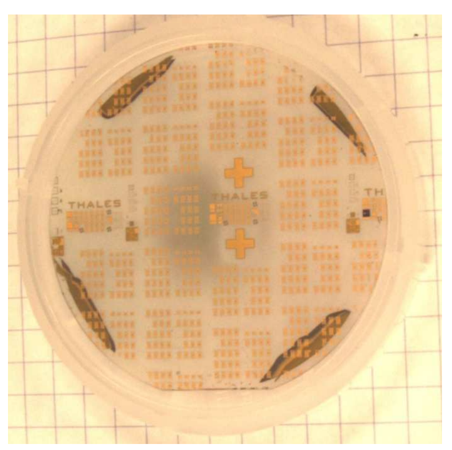
1st run fabrication on 3-inch LCP substrate of TiO_2 based RF MEMS switches

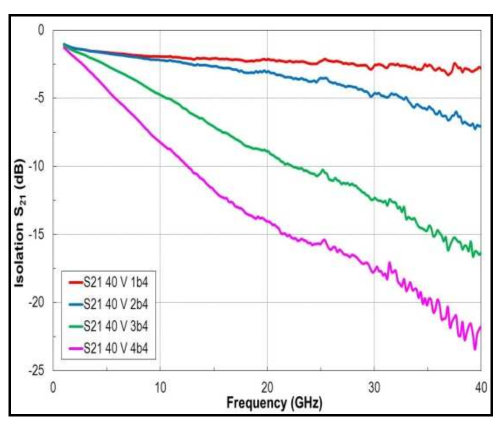


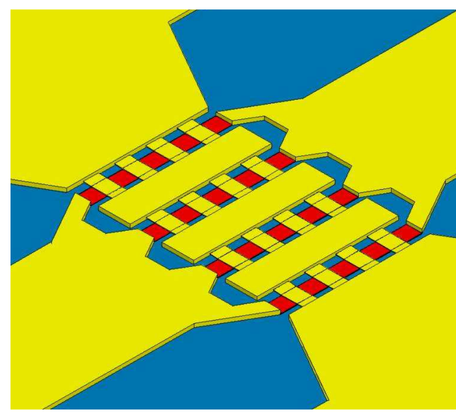


- **Assessment of technological feasibility**
- **Improvements identified for a compatibility with RF MEMS technology**
- **Validation of RF MEMS switching function on LCP**

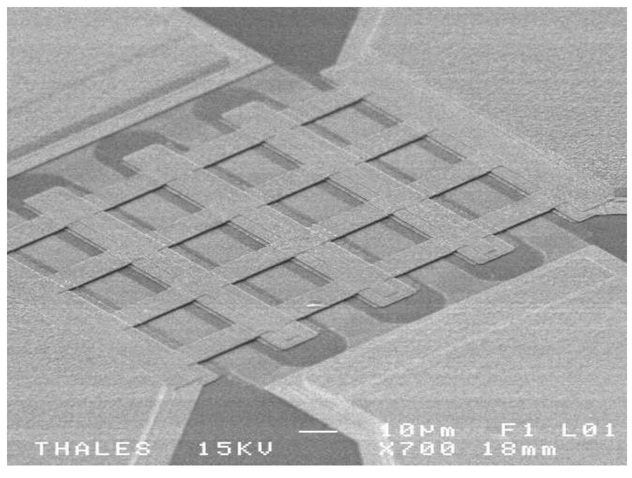
RF MiniMEMS





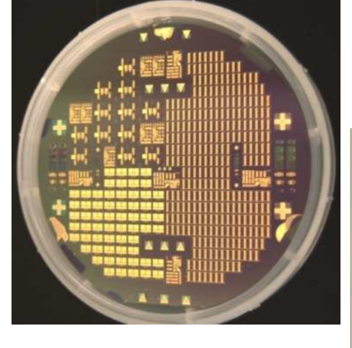


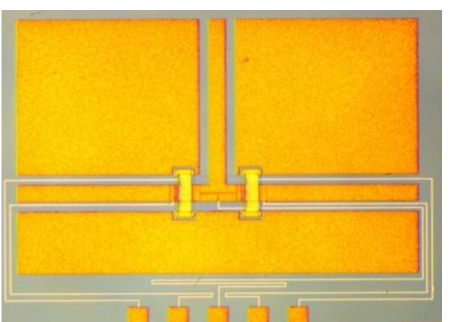
✓ **First demonstration of RF MiniMEMS with <1µs switching time**



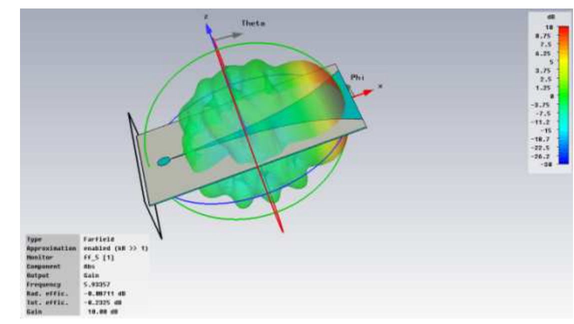
WP 4: Design, fabrication and test of GaN, LCP and Si based RF-MEMS circuits and LCP boards

- SPDT
  - Design finalized for GaN/Si
  - First fabrication run finished
  - First characterisation started

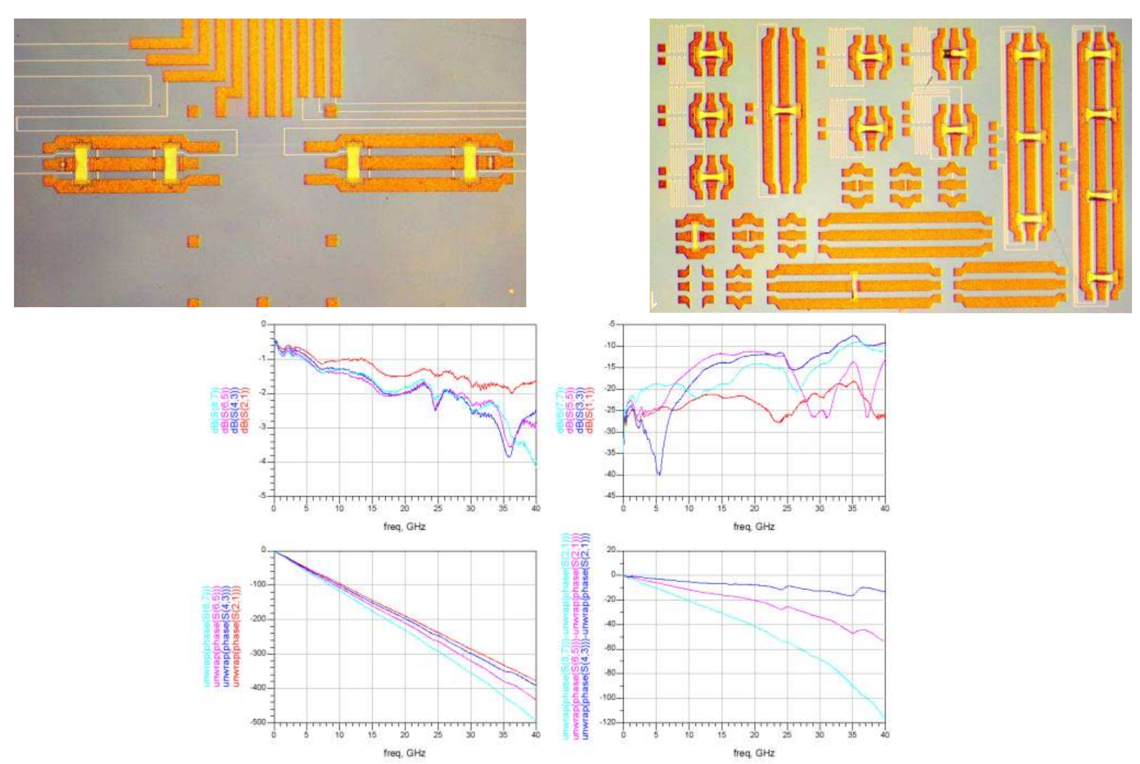




- UWB Antenna and RA Antenna
  - Antenna cells simulated for Si-HR and LCP substrate
  - UWB antenna simulated for 3.4-8 GHz and 8-20 GHz



- Matching network
  - Calibration standards on chip cal-kit
  - Test circuits (RF MEMS switching circuits and fixed capacitors)



- Newsletter
- Publications (22)
- Forum poster (2)