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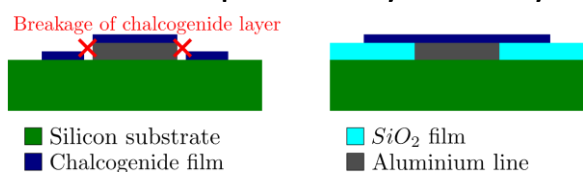
### Context

- Exploring 2 new techniques for reconfigurable microwave devices and antennas
  - Phase change materials (chalcogenide thin films) optically controlled
  - Substrate integrated semi-conductor junction electronically controlled
- Final goal: combining both techniques to multiply the reconfiguration possibilities and so the functionalities in a same component while limiting the complexity

### Reconfiguration using chalcogenide

- Material (GST) with 2 stable states (crystalline high  $\sigma$  / amorphous low  $\sigma$ )
- Second tests : DBR filters, characterization circuits

- Planarization process by SiO<sub>2</sub> layer



- Potential compatibility issues between SiO<sub>2</sub> layer and GST

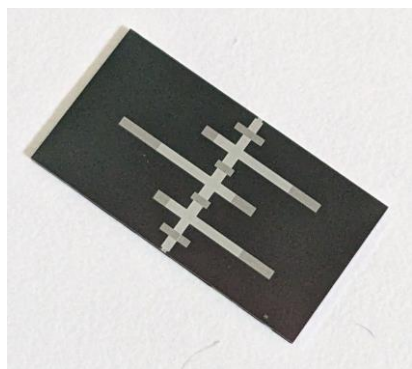
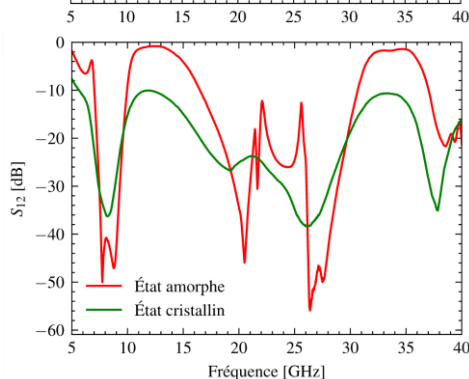
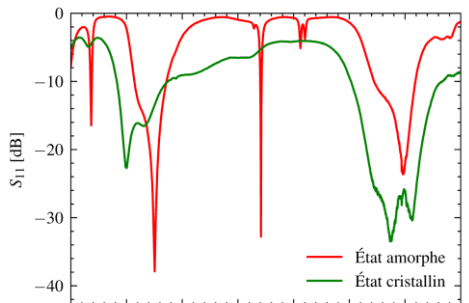


"Bubbles" in amorphous state

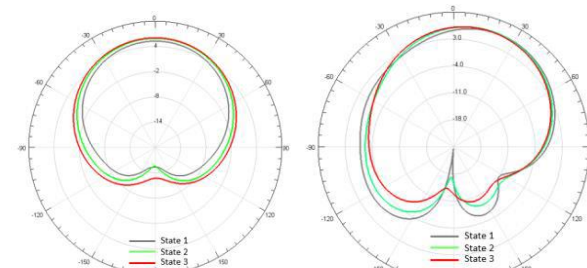
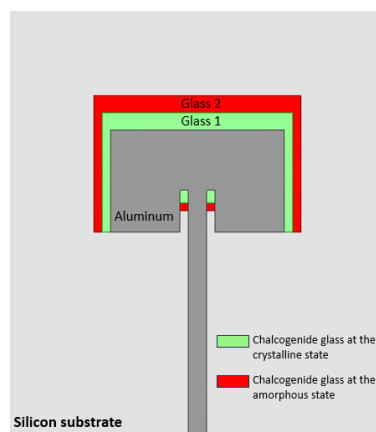


"Bubbles" in crystalline state

- Incomplete crystallisation with a low conductivity disabling reconfigurability (12 GHz to 8 GHz in simulation)



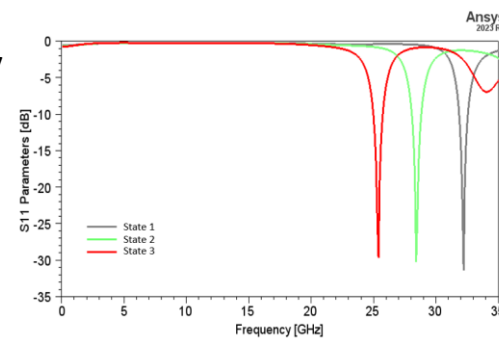
### Retractable matching antenna



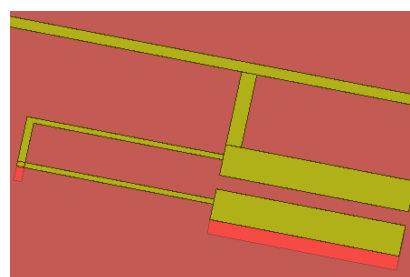
E-plane

H-plane

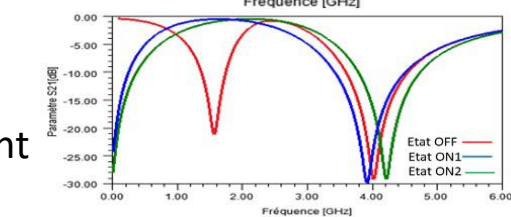
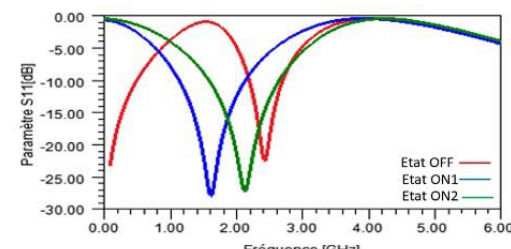
- Antenna's reconfigurability through the use of chalcogenide thin films: frequency variation and matching.
- Fabrication in progress



### Switchable resonator with doped area



- Co-design device
- More design flexibility
- No component postponement
- One DC control signal



### Conclusion and perspectives

- Obtained results not up to our expectations mainly due to technological problems, but:
  - Fabrication process is now being stabilized
  - New knowledge about chalcogenide materials and their optical actuation
  - A lot of ideas to combine both reconfiguration techniques
- DATERAC will be continued and will allow to combine both techniques!**  
=> ANR MACIEO (2024-2027) with the same 4 partners

