

Ilaria Maticena

Tutor: Santolo Daliento

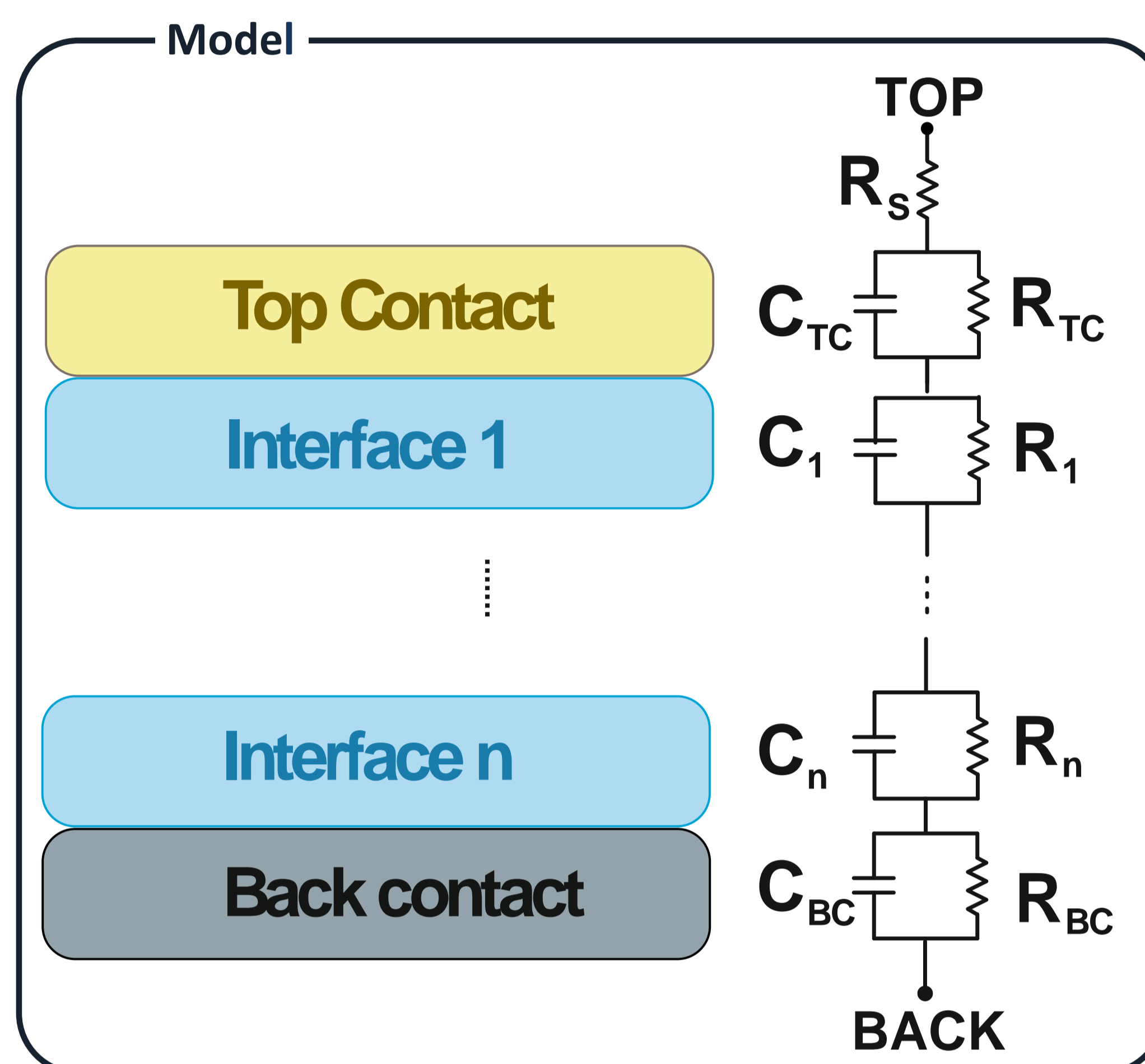
XXXIII Cycle - II year presentation

Impedance spectroscopy for interface characterization in semiconductor devices

Interfaces between different materials, and microscopic phenomena taking place at such interfaces, define the overall macroscopic performance of the device. The understanding of those phenomena is of paramount importance for the effective design of the semiconductor device



- Capacitance measurements
- Impedance measurements

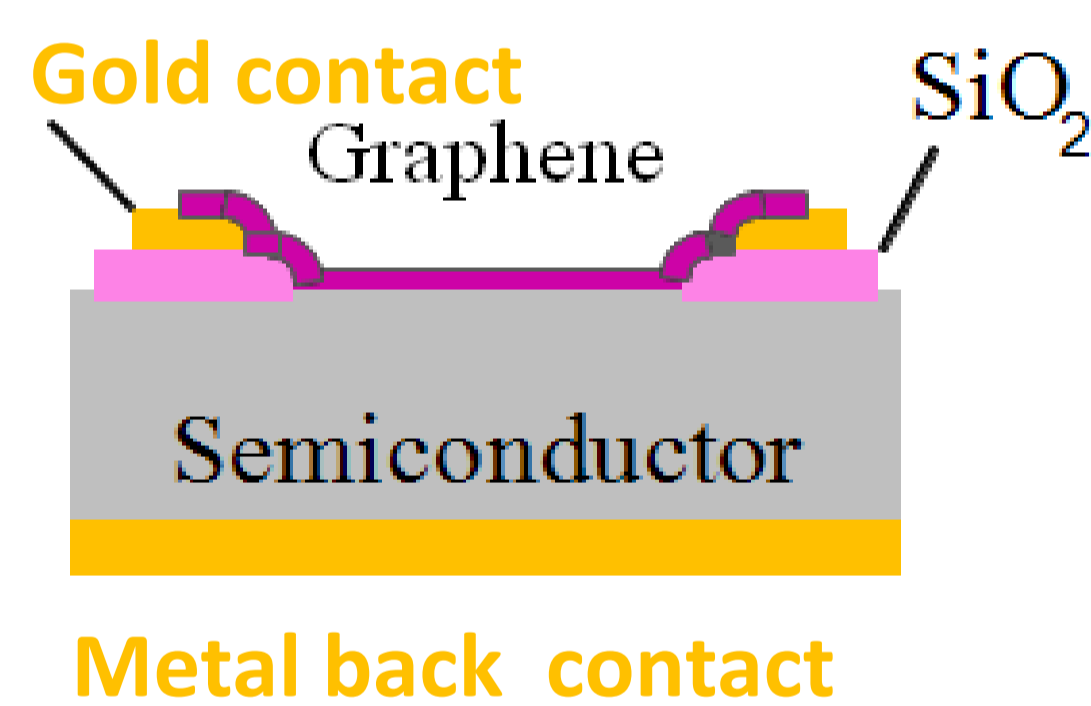


Extraction procedure

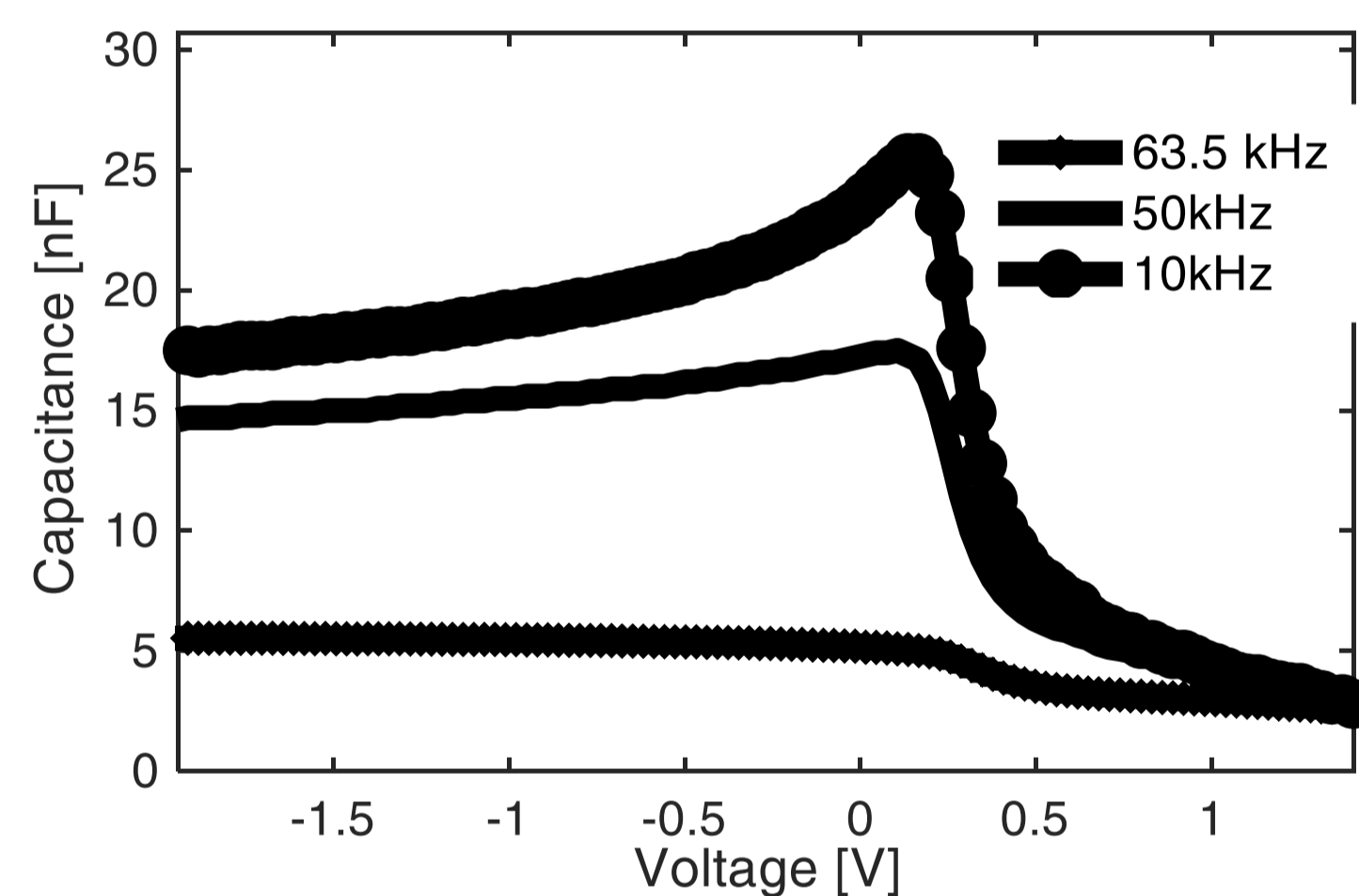
- **Automatic procedure** to extract the number of RC pairs needed to model the experimental Nyquist plot
- The procedure automatically identifies a **unique circuit schematic**, suitable for all the considered DC bias voltages, while the corresponding resistance and capacitance values extracted are voltage dependent.
- The novelty of the proposed solution relies on the **cross information gained by experimental Nyquist plots**, to automatically assign initial values for the extraction procedure, and C-V plots, to ensure higher reliability than mere analytic fit.

GRAPHENE SOLAR CELLS

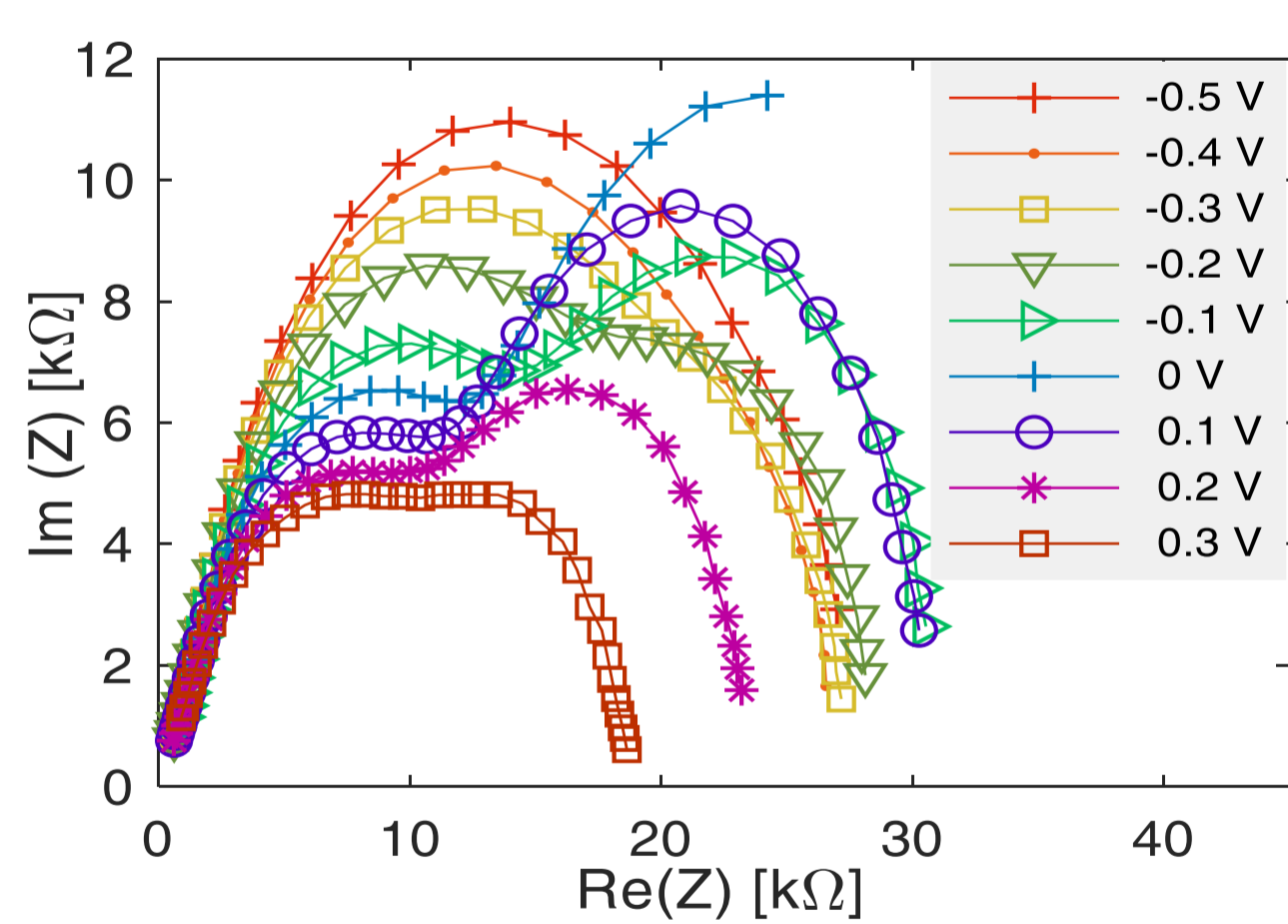
Structure



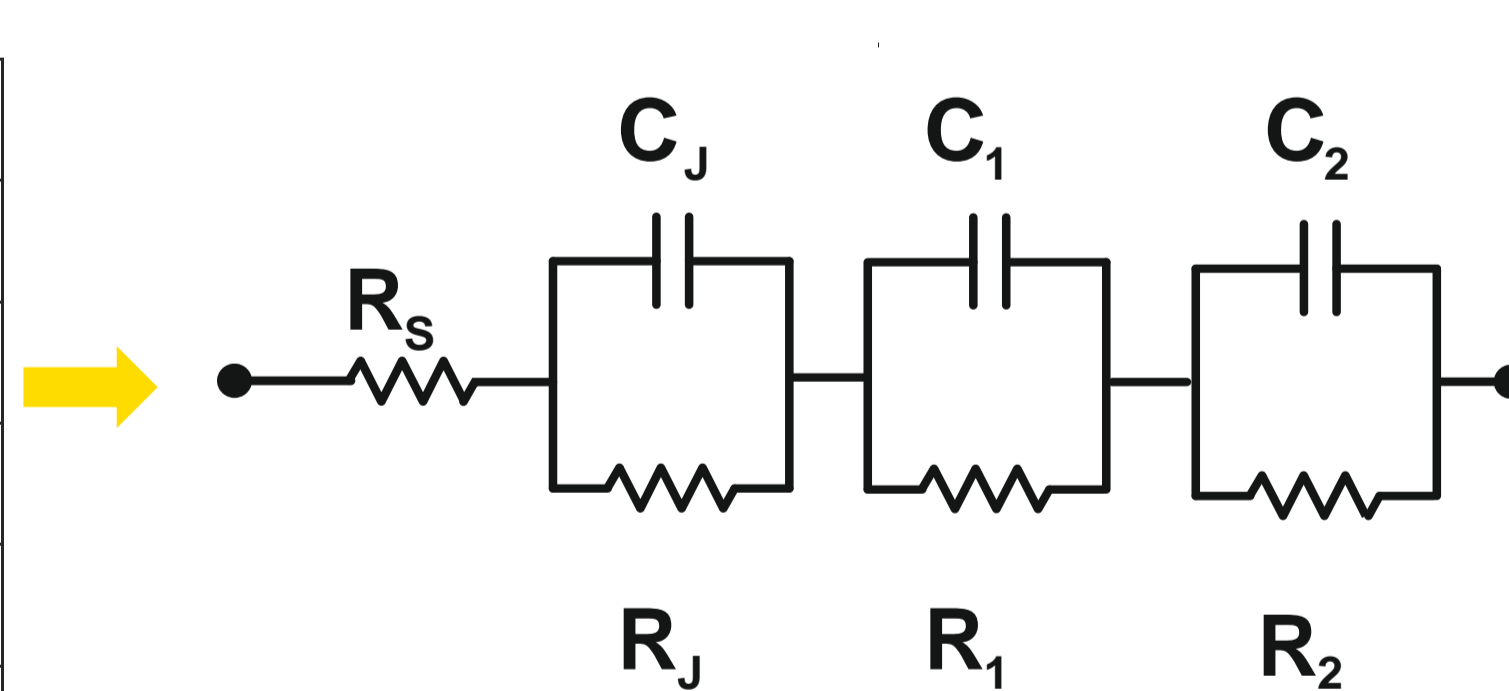
Experimental C-V curves



Experimental Nyquist plots

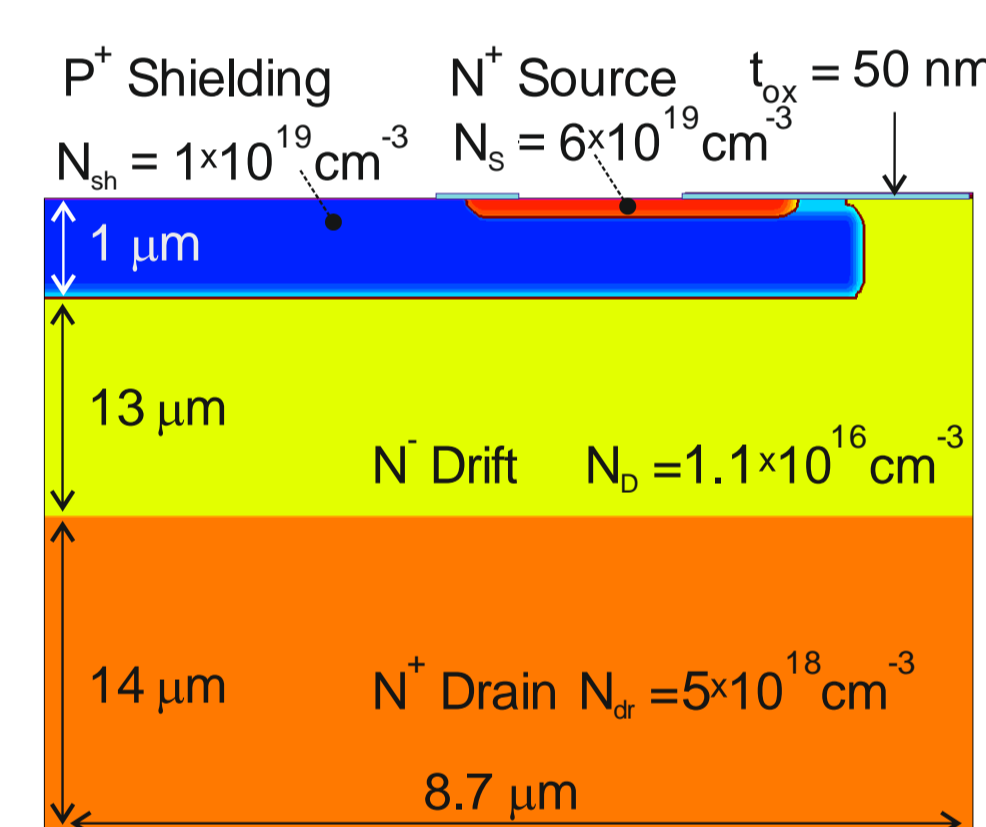


Equivalent circuit extraction

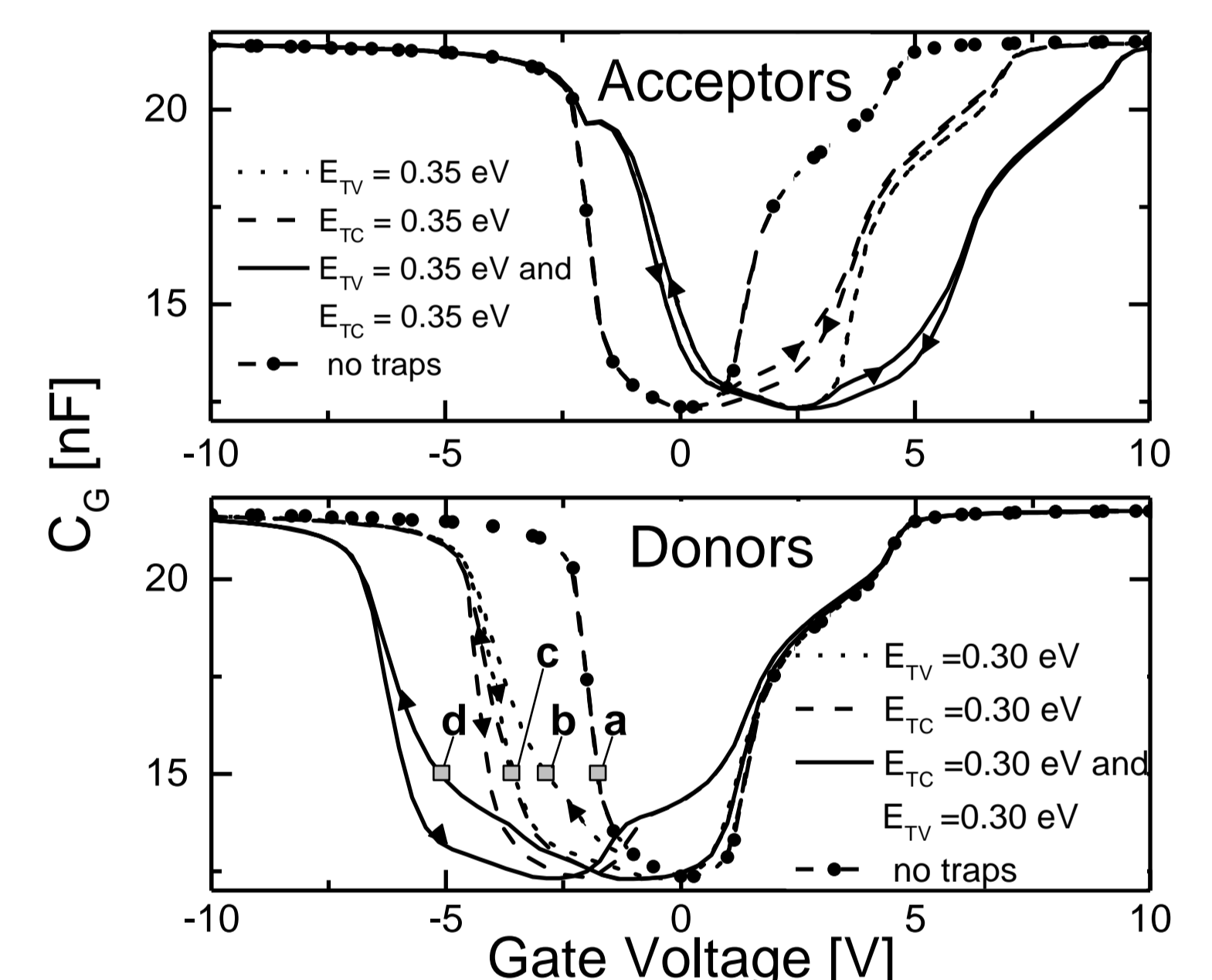


SiC MOSFETs

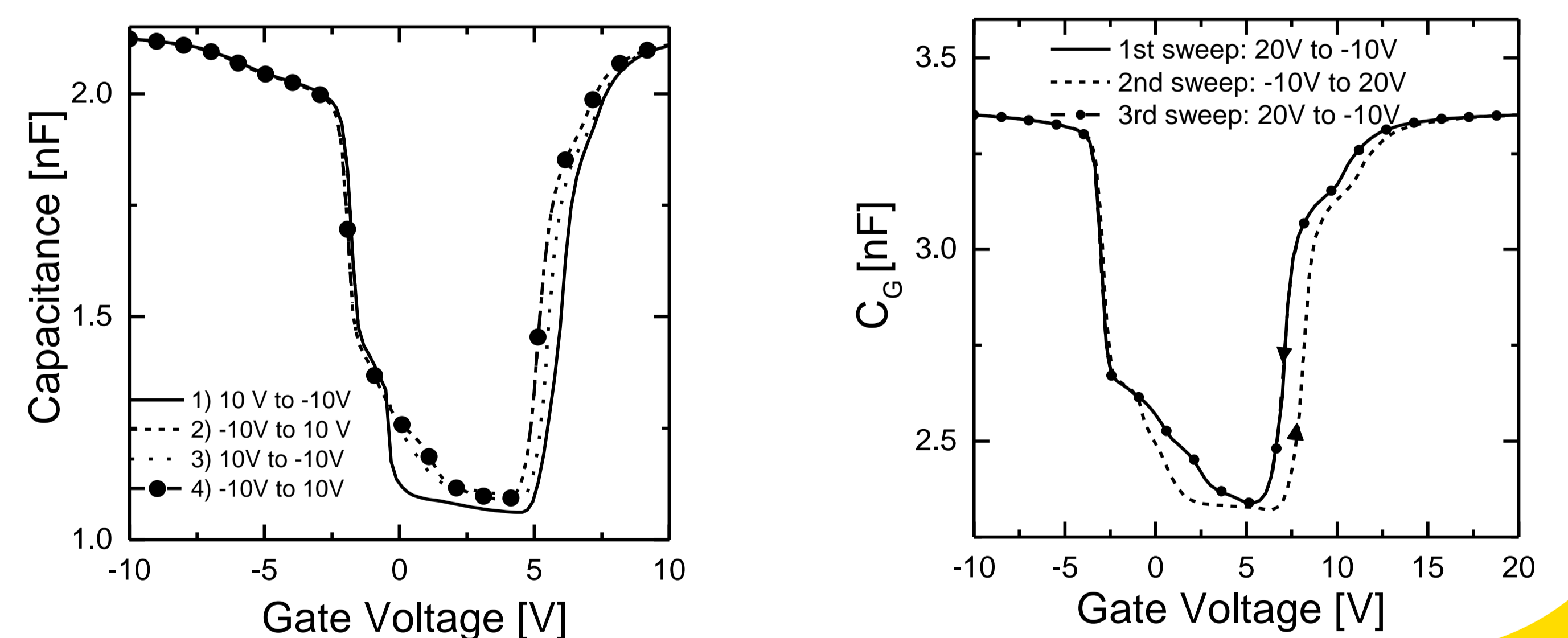
TCAD structure



Traps effects on C-V curves



Experimental C-V curves of commercial SiC MOSFETs



Enea Portici
Research Center



Future work:

- Extract physical parameters from the extracted equivalent circuit.
- Build a more accurate TCAD setup to further understand interface.
- Move this analysis to multilayer structures.