Ilaria Matacena

Tutor: Santolo Daliento

XXXIII Cycle - I year presentation

Impedance spectroscopy for interface characterization in semiconductor devices

Background

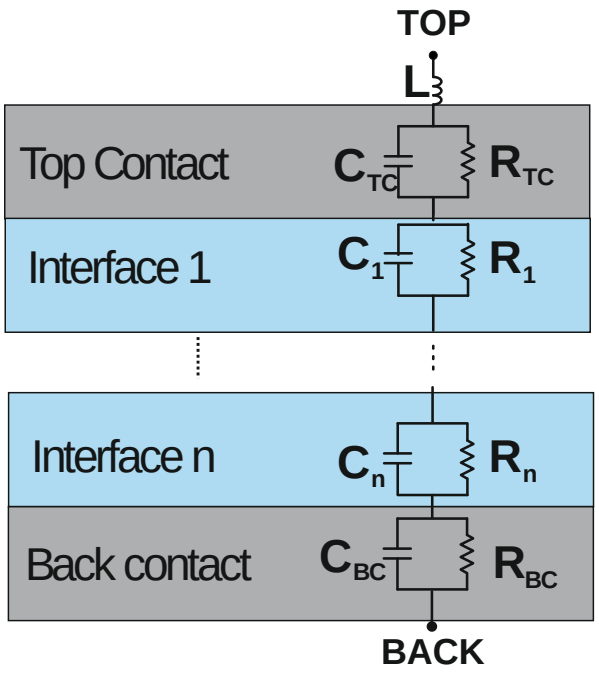
M.Sc.	Ph.D.
Electronic Engineering Date: 14th Dec 2016 Subject: Microelectronics *Prof. Vincenzo d'Alessandro* *Prof. Marco Spirito* Title:"*Ultra-Wideband dielectric spectroscopy using an open-ended coaxial probe at MW frequencies*".	Electronic Engineering- ING-INF/01 Tutor: *Prof. Santolo Daliento* Athenaeum fellowship Microelectronic Technologies Laboratory, Building 2, Via Claudio, 21 Tel: +39 081 76 83800

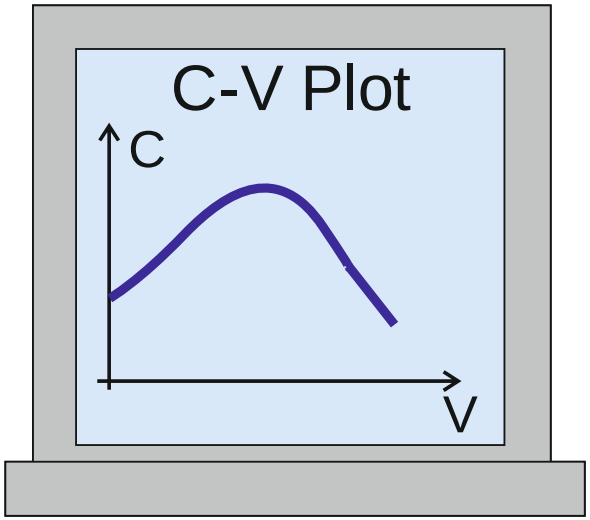
Cooperation

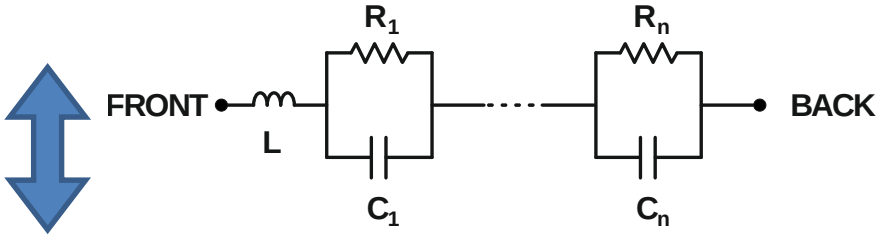
Enea Portici Research Center

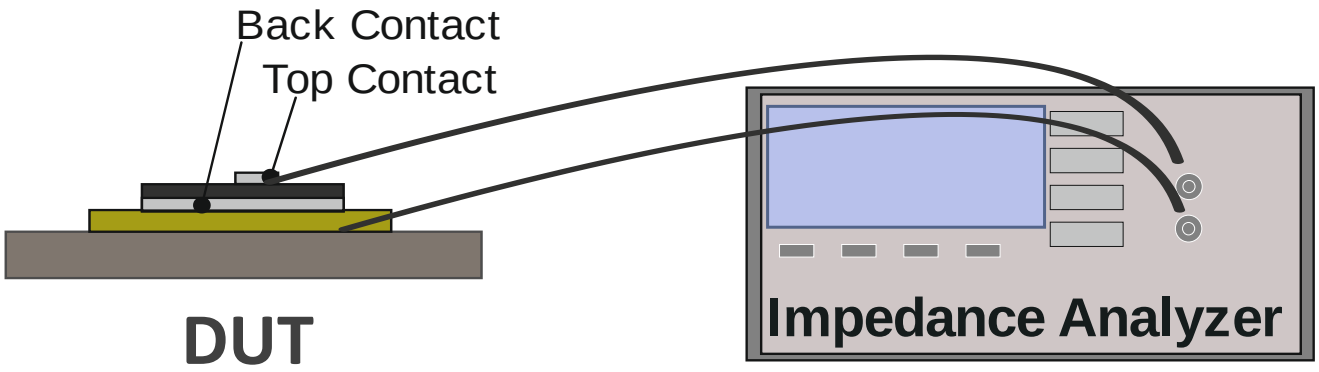
Agenzia nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile

Impedance Spectroscopy

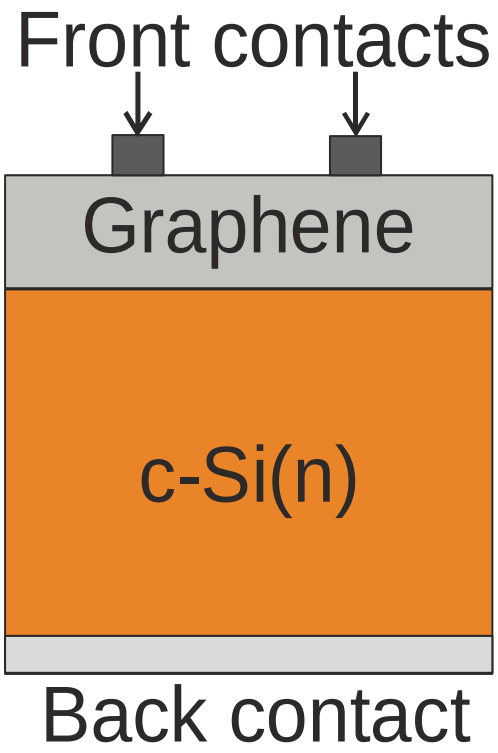


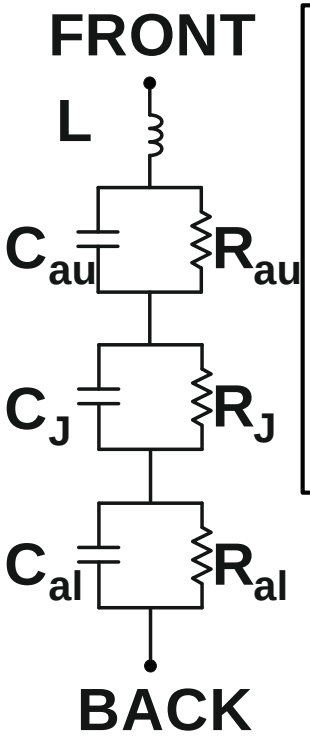




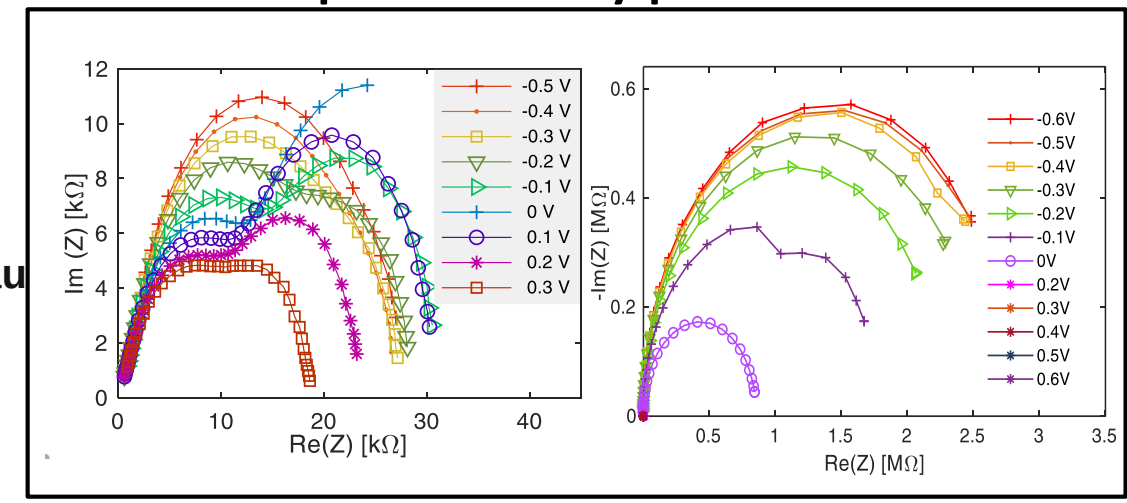


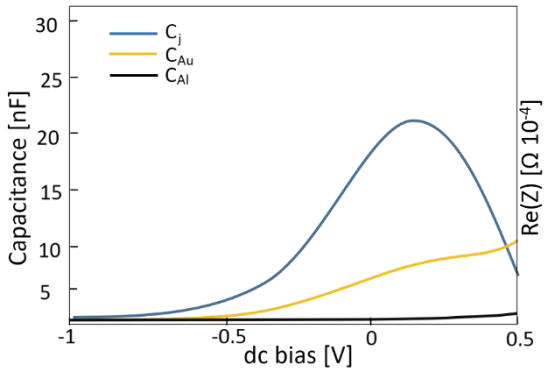
Impedance Spectroscopy for Graphene Solar Cells Charcterization

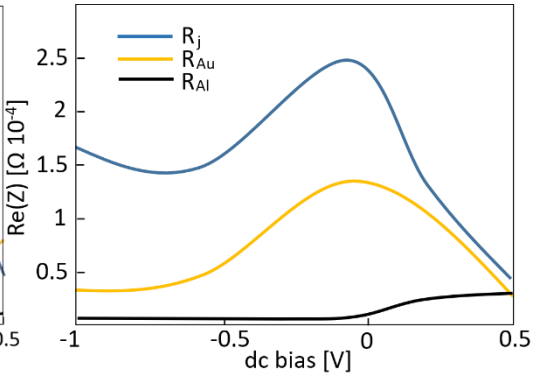




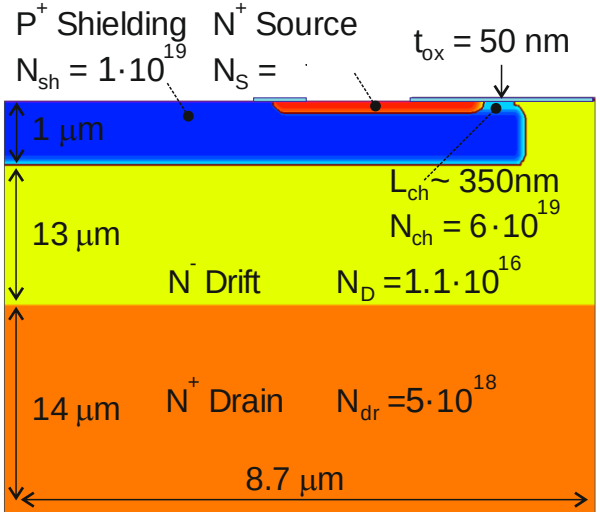
Experimental Nyquist Plots



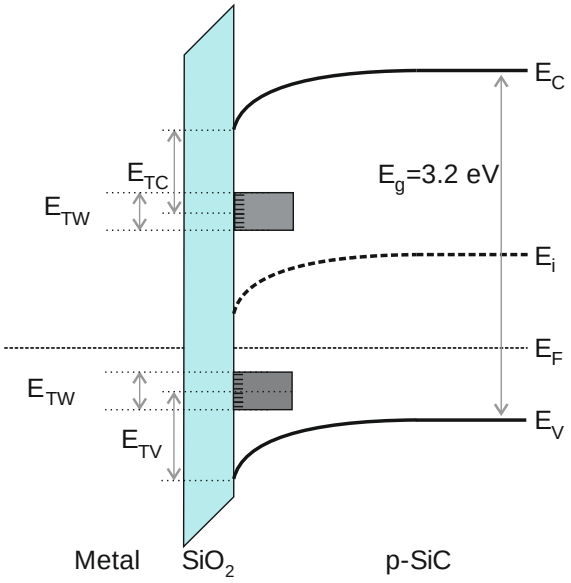




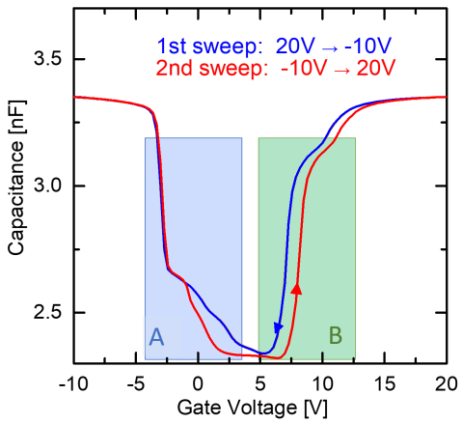
Impedance Spectroscopy for SiC Power MOSFET Characterization

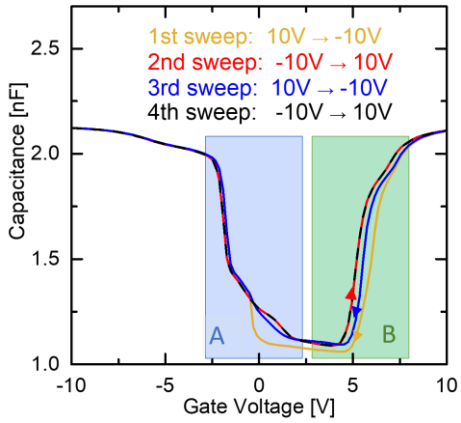


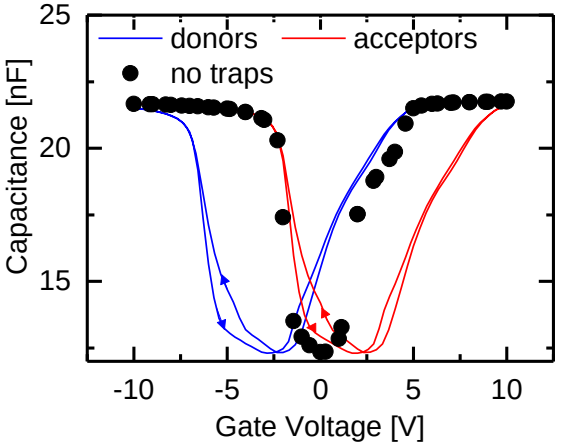
SiC MOSFET TCAD structure (not in scale).



Band diagram of the structure. Traps are modeled with a square trap band distribution, where E_{TW} is the distribution width and E_{TV} and E_{TC} are the distance of the band center from the valence and conduction band, respectively







1st year production

Journal papers	Maresca, Luca, Matacena, Ilaria, Riccio, Michele, Irace, Andrea, Breglio, Giovanni and Daliento, Santolo "*Evaluation of the Si/SiO2 interface traps distribution by C-V measurements for calibrated SiC MOSFET TCAD simulations*". Journal of Emerging and Selected Topics in Power Electronics (under revision).
Conference papers	1. P. Guerriero, I.Matacena, and S. Daliento. "*Reconfiguration of solar fields by means of forced activation of bypass diodes.*" In 2018 International Symposium on Power Electronics, Electrical Drives, Automation and Motion (SPEEDAM), pp. 817-822. IEEE, 2018. 2. I. Matacena "*Avoiding the Hot Spot Occurrence*". In SIE2018, 50th Annual Meeting of Associazione Societa' Italiana di Elettronica 3. P. Guerriero, P. A. Cennamo, I. Matacena, and S. Daliento. "*Avoiding the Hot Spot Occurrence in PV Modules*." In 2018 IEEE International Conference on Environment and Electrical Engineering and 2018 IEEE Industrial and Commercial Power Systems Europe (EEEIC/I&CPS Europe), pp. 1-5. IEEE, 2018. 4. I. Matacena, et al. *"Impedance spectroscopy characterization of a graphene based solar cell with improved contacts",* ELECTRIMACS 2019 (accepted). 5. L.Lancellotti, N. Lisi, P. Delli Veneri, E.Bobeico, I. Matacena, P. Guerriero, S. Daliento "*Graphene-on-Silicon solar cells with graphite contacts*", ICCEP,2019 (under revision).

Next years…

Research activity:

- Extract physical parameters from RC networks…
- Build TCAD setup to further understand interface traps distribution.
- Move this analysis to multilayer structures.

	Credits year 1								Credits year 2								Credits year 3									
		1	2	3	4	5	6			1	2	3	4	5	6			1	2	3	4	5	6			
	Estimated	bimonth	bimonth	bimonth	bimonth	bimonth	bimonth	Summary	Estimated	bimonth	bimonth	bimonth	bimonth	bimonth	bimonth	Summary	Estimated	bimonth	bimonth	bimonth	bimonth	bimonth	bimonth	Summary	Total	Check
Modules	20	0	0	4	0	9	9.4	**22**	10							**0**								**0**	**22**	30-70
Seminars	5	4	1		0.2	0	0	**5.2**	5	0	0	0	0		0	**0**								**0**	**5.2**	10-30
Research	35	6	9	6	9.8	1	0.6	**32**	45	0	0	0	0	0	0	**0**	60							**0**	**32**	80-140
	60	10	10	10	10	10	10	**60**	60	0	0	0	0	0	0	**0**	60	0	0	0	0	0	0	**0**	**60**	180