Politecnico di Milano

PhD in
Information Technology

Research Area n. 2 - Electronics

Research Title:
Characterization and modeling of advanced reliability issues in 3D NAND Flash memory devices

Scholarships and Financial support	
Monthly net income of PhD scholarship (max 36 months)	€. 1250 (In case of a change of the welfare rates during the three-year period, the amount could be slightly modified)
Increase in the scholarship for stays abroad	€ 566,36 per month, for up to 6 months
Number of scholarships	1
Beginning of PhD	1 February 2021
Deadline for application	*3 December 2020*
Context of the research activity	
Motivations and objectives of the research in this field	NAND Flash is today's mainstream storage technology and, since 2013, takes advantage of 3D integration for the manufacturing of 3D memory arrays. In such structures, cells are vertical-channel transistors with polysilicon body, which feature different characteristics with respect to planar devices. Reliability in particular is strongly affected by the polysilicon channel and by defects at the grain boundaries. Focusing on mainstream 3D NAND Flash arrays, the research will investigate advanced issues like random telegraph noise and charge trapping/detrapping in the cell tunnel oxide, as well as transient phenomena induced by polysilicon

	defects, with the aim of assessing their constraints to the evolution of future 3D technology nodes.
Methods and techniques that will be developed and used to carry out the research	The research will involve the experimental characterization of memory arrays via dedicated measurement setups as well as the development of suitable models and simulations for the physical interpretation of the explored reliability issues.
Educational objectives	The candidate will gain specific skills in the characterization, interpretation and modelling of advanced key issues related to the design of future memory technology nodes.
Job opportunities	Part of the research will be carried out at Micron's premises in Vimercate and, if needed, in USA, which usually results in a hiring offer. 100% of our former Ph.D. graduates now work in one of the world leading non-volatile memory companies (Intel, Micron) in Italy or in the USA.
Composition of the research group	Number of Full Professors: 2 Number of Associated Professors: 1 Number of Assistant Professors: 0 Number of Post-Docs: 1 Number of PhD students: 2 Number of contracted researchers: 0
Names of the research directors	Alessandro Spinelli Christian Monzio Compagnoni
Contacts	Email: alessandro.spinelli@polimi.it Phone: 02 2399 4001 Email: christian.monzio@polimi.it Phone: 02 2399 4038
List of Universities, Companies, Agencies and/or National or International Institutions that are cooperating in the research	1. Micron semiconductor Inc, Vimercate, Italy 2. Micron semiconductor Inc, Boise, USA

Additional support

Educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student per year	2nd year: max 1534,00 euro per student 3rd year: max 1534,00 euro per student
Teaching assistanship: availability of funding in recognition of supporting teaching activities by the PhD student	There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.
Computer availability:	1st year: *individual use* 2nd year: *individual use* 3rd year: *individual use*
Desk availability:	1st year: *individual use* 2nd year: *individual use* 3rd year: *individual use*