Magnetic Alloys Deposited on Semiconductors: Structure and Properties

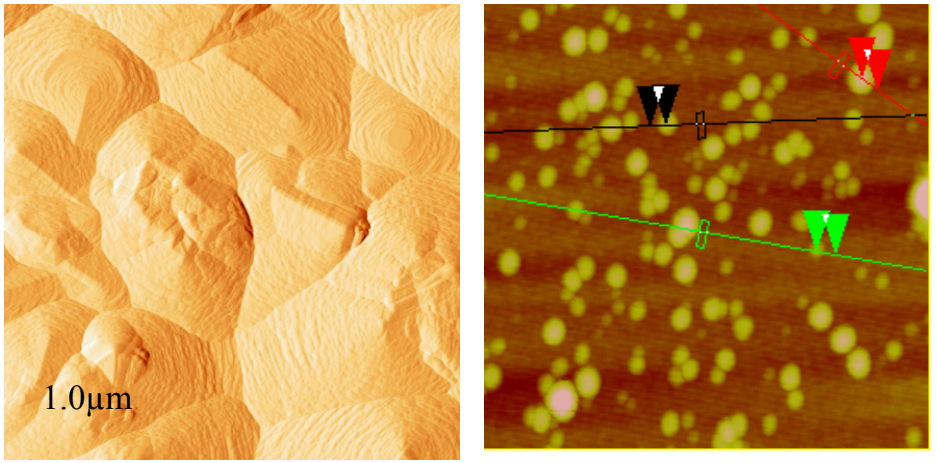
Giovanni Zangari, University of Virginia – DMR-0303472

This work is being performed in the framework of the **NSF Inter-American Materials Collaboration Initiative**.

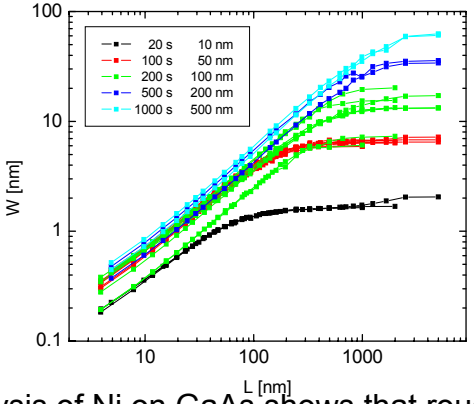
Roughness analysis during the growth of magnetic alloys on semiconductors is carried out with the objective to understand and eventually control the processes responsible for roughening.

This project is foreseen to eventually provide effective techniques for the integration of magnetic films with semiconductors, and to reinforce ties between the two performing institutions

Systems under study include the 3d metals Fe, Co, Ni and will include alloys of the above, onto elemental semiconductors (Si) and III-V compounds (GaAs).



1 μm× 1μm AFM images of Ni on GaAs (left) and on Si (right). Island growth is observed on Si, consequently the accepted formalism of roughness evolution cannot be applied in the latter case.



Roughness analysis of Ni on GaAs shows that roughening follows the accepted anomalous scaling behavior (PRL **86**, 256)

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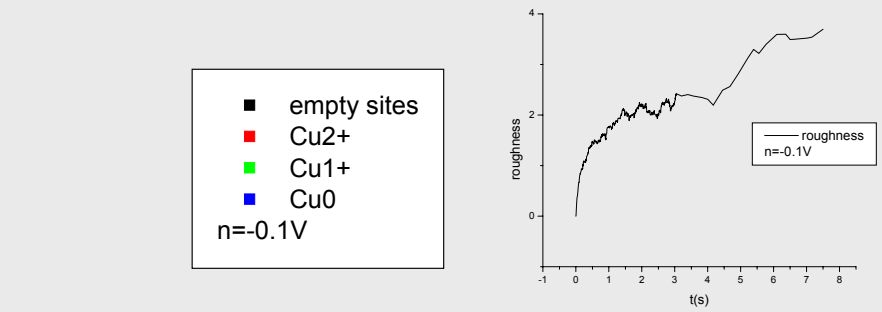
Education and broad impact:

One graduate students (D. Kirkwood) and one post-doc (G. Pattanaik) are contributing to this work.

A series of talks was delivered by the PI at the collaborating institution in Brazil.

A series of talks was delivered and experimental work were performed at UVa by a co-Pi (Andre Pasa) of the collaborating institution.

A student from the collaborating institution (Vanessa Leite) performed modeling work at UVa during June-August 2004



Andre Pasa and Vanessa Leite enjoy a Saturday afternoon In Charlottesville VA

2D Monte Carlo modeling performed by Vanessa yields morphology and roughness of magnetic films on semiconductors as function of growth conditions