Andrea Migliorini

Curriculum Vitæ

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Objective

Goal Pursuing a PhD student position in a top research institution or university in nanotechnology.

Research Interests
- Spintronics and magnetic materials
- Nanotechnology for energy sustainability (e.g. photovoltaics, fuel cells, energy storage)
- Thin films (Physics and technology)

Education

2010–Present **M.S. Degree in Physics Engineering**, *Politecnico di Milan*, Milan, Italy.
Selected as one of the first participants in the newly formed EAGLES International Exchange Program between Politecnico di Milano (Italy), Drexel University (USA), Universidad Politécnica de Madrid (Spain)
Key subjects: Solid State Physics, Photonics, Low Dimensional Systems, Nanotechnology, Photovoltaics, Electron and Atomic Force Microscopies.
Anticipated Graduation Date: July, 2013

2011–2012 **M.S. Degree in Mechanical Engineering and Mechanics**, *Drexel University*, Philadelphia, PA, USA.
Studies and research as part of EAGLES International Exchange Program
Key subjects: Heat Transfer, Plasmas, Statistical Mechanics, Computer Science, Mathematics.
GPA: 3.83/4.00

2007–2010 **B.S. in Physics Engineering**, *Politecnico di Milan*, Milan, Italy.
Key subjects: Fundamental Physics, Quantum Mechanics, Optics and Laser, Material Science, Mathematics, Electronics.
Final score:108/110

2002–2007 **Scientific High School Diploma**, *Liceo Scientifico Statale Galileo Galilei*, Caravaggio Bergamo, Italy.
Achievements: Member of school team for participation in Mathematics Olympics.
Final score:100/100

Master's thesis

Title *Spin valves for CPP electronic nanodevices*

Supervisors Dr. Franco Ciccacci — *Politecnico di Milano, Milan, Italy*
Dr. Jose Luis Prieto — *Universidad Politécnica de Madrid, Madrid, Spain*

Description Fabrication of Current Perpendicular-to-Plane (CPP) Spin Valve nanodevices has been achieved. Spin Valves have been grown through Magnetron Sputtering Deposition and their magneto-electrical properties have been optimized after electrical characterization. A CPP configuration has been achieved through Inductively Coupled Plasma Reactive-Ion Etching (ICP-RIE) and Magnetron Sputtering Deposition.

Experience

2012–2013 **Research Assistant**, *Grupo de Dispositivos Magnéticos (GDM)*,
ISOM, Universidad Politécnico de Madrid, Madrid, Spain.
Research Project: Spin Valves for CPP Electronic Nanodevices.

- Design of thin film layer stacks
  - Layer structure & materials to create "Spin-Valve" structures
  - Optimization for Magnetoresistance and Exchange Bias
  - Understanding of quantum theories of ferromagnetism & giant magnetoresistance
- Film Stack Deposition
  - D.C. & R.F. Magnetron Sputtering
  - Clean room procedures (class 100-1000)
  - Substrate preparation & cleaning
  - Nano-Lithographic techniques (Electron Beam Lithography)
- CPP Device Fabrication
  - Thin film stack deposition, via a combination of R.F. & D.C. sputtering
  - Design and nano-lithography of contact patterns and wire geometry
  - Inductively Coupled Plasma Reactive-Ion Etching (ICP-RIE)
- Characterization
  - 4T sensing
  - Ultrasonic Wire Bonding (wedge-type)
  - Vibrating Sample Magnetometry
  - Electronic measurements

2010 **Student Research Experience**, *Physics Department*,
Politécnico di Milano, Milan, Italy.
Research Project: Measurement of Superconducting Transition in Type-II Superconducting Materials (YBCO)
Project Lead: Dr. Ermanno Pinotti — Politecnico di Milano

- Experimental
  - Cryogenic (LN) cooling
  - Measurement of zero electrical DC resistance
  - Transition temperature measurement
  - Meissner effect measurements
  - H-T curves, and analysis
  - Josephson effect
  - Flux tubes
- Main Competencies
  - Superconductivity and superconductive materials
  - Thermocouples
  - 4T sensing
  - Lock-in amplifiers
  - R-L Circuitry

Equipment Training & Experience

Thin Film Deposition Atomic Layer Deposition (ALD), Chemical Vapor Deposition (CVD), Pulsed Laser Deposition (PLD), Molecular Beam Epitaxy (MBE), R.F. & D.C. Sputtering, Sol-Gel Deposition, Thermal Evaporation, E-Beam Evaporation.

Film Analysis Methods X-Ray Diffractometry (XRD), X-Ray Reflectivity (XRR), Scanning Electron Microscopy (SEM), Energy-Dispersive X-Ray Spectroscopy (EDXS), X-Ray Fluorescence Spectroscopy (XRF), Ellipsometry, Rutherford Backscattering Spectroscopy (RBS), Raman Spectroscopy, Photoluminescence Spectroscopy (PL).

Chemical Analysis Fourier-Transform Infrared Spectroscopy (FTIR), Differential Scanning Calorimetry (DSC), Thermo-gravimetric Analysis (TGA), Gas-Chromatography/Mass-Spectroscopy (GC-MS).

Electrical Analysis Hall Effect measurements, Cyclicvoltammetry (CV), Piezoelectric/Ferroelectric measurements, Piezoelectric force microscopy (PFM), Vibrating Sample Magnetometry (VSM).

General Ultrasonic Wire Bonding, Clean Room Procedures (ISO Class 3-4).

Computer skills

Languages MATLAB, LaTeX

Tools Origin, Abaqus (FEM), LabView, LaTeX,
Microsoft Office Suite

Spoken Languages

Italian **Native Tongue**

English **Fluent** (2012, IELTS: 7.5 of 9.0)
Sept. 2011 – Jul. 2012: Studies in Philadelphia, PA, USA

Spanish **Fluent**
Summer 2010: Stay in Barcelona, Spain
Nov. 2012 – Jul. 2013: Research work at UPM in Madrid, Spain

Personal Interests

Energy Nanoscale structures and materials for high-efficiency photovoltaic devices and energy storage applications.

Electronics Design and fabrication of materials and devices for IC applications, particularly those leveraging nanoscale properties

Hobbies Culinary Arts, Skiing, Golf, Tennis, Sailing.