# GIOVANNI MARIA VINAI

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Scopus Author ID: 38062268300
Born in Savigliano (CN) - Italy - on 15/10/1986; Italian; Bachelor


# PhD Doctor in Material Science

## Professional experience

2018 – today **Development of an in-house research field** on magnetoelectric coupling and multiferroic heterostructures

**Responsible of APE-HE beamline** for the UHV setup (XAS and XMCD characterizations)

**Local contact** of APE-HE beamline for users coming from Elettra, NFFA-TS and NFFA-EU proposals

**Scientific collaboration** with international groups

Participant of the European **FET-OPEN** Project **SINFONIA** (2021-2025)

3 papers as first name author, 10 paper as co-author, 6 talks (JEMS 2018, FisMat 2019, MAGNET 2019, Sol-SkyMag 2019) at international conferences

2014 – 2018 ***Post-Doc fellow*** at IOM – CNR at APE-HE beamline in ELETTRA synchrotron - Trieste

**Instrumental development** of UHV chamber system for MBE deposition and in-situ electronic, magnetic and structural characterization for the investigation of highly correlated systems with reduced lateral dimensions.

**In-house research** on multiferroic materials and multiferroic heterostructures.

**Local contact** activity on APE-HE beamline: investigation of electronic, structural, and magnetic properties by means of STM, LEED, XPS, XAS, XMCD, XMLD.

3 papers as first name author, 12 paper as co-author, 6 talks (DIMEMN 2015, AIM 2016, JEMS 2016, SuperFOx 2016, MAGNET 2017, FisMat 2017) and one poster (ICMFS 2015) at international conferences

2010 – 2013 ***PhD*** at SPINTEC – CEA Grenoble in partnership with Crocus Technology start-up

**Scalability and improvement of exchange bias properties for Thermally Assisted-MRAM:** study of exchange bias variability on IrMn/Co square patterned dots through focalized Kerr effect. Optimization of exchange bias properties in temperature.

Cleanroom accreditation (SEM, IBE, EDX, EBE, chemical bench), simulation (Python), magnetic characterization (MFM, VSM, MOKE, XRD, EHE)
5 papers as first name author, 1 paper as co-author, 3 talks at international conferences (INTERMAG 2012, JEMS 2013 and MMM 2013)

2010 ***Master Final Internship*** at Spintec – CEA Grenoble (6 months)

**Magnetic properties of sub-500nm patterned media:** patterning of exchange biased square dot systems for MFM analysis under in-situ applied field

2009 ***Master internship*** at Spintec – CEA Grenoble (3 months)

**MFM characterization of multilevel magnetic recording on prepatterned media:** study of patterned multilayer systems after demagnetizing field for 2bit-per-dot data recording media

2 papers as co-author

## Formation

| | |
|---|---|
| 2010 - 2013 | **PhD in Physics** at Grenoble University |
| 2009 - 2010 | Master of Science EEATS Micro-Nano Electronique at UJF - INPG |
| 2008 - 2010 | **Master Nanotech**; Final mark: **110/110**<br>Master Degree in Nanotechnologies shared by three engineering establishments: Politecnico di Torino, INP Grenoble and EPFL (see http://nanotech.grenoble-inp.fr/) |
| 2005 - 2008 | **Engineering Physics** Degree at Politecnico di Torino; Final mark: **110/110 with honors** |

## Languages

| | |
|---|---|
| Italian | Mother Tongue |
| English | Full professional proficiency |
| French | Full professional proficiency |
| Spanish | Basic knowledge |

## List of scientific publications

- *Evidence of a thermally-induced microstructural anisotropy in Gr/Co/Ir(111) systems*
  Carlomagno, I., Scaparro, A.M., Carlini, L., Drnec, J., **Vinai, G.**, Torelli, P., Felici, R., Mobilio, S., Meneghini, C.
  (2021) Applied Surface Science, **535**, art. no. 146365, .
  DOI: 10.1016/j.apsusc.2020.146365
- *Strong-coupling charge density wave in monolayer TiSe2*
  Watson, M.D., Rajan, A., Antonelli, T., Underwood, K., Marković, I., Mazzola, F., Clark, O.J., Siemann, G.-R., Biswas, D., Hunter, A., Jandura, S., Reichstetter, J., McLaren, M., Le Fèvre, P., **Vinai, G**., King, P.D.C.
  (2021) 2D Materials, **8**, art. no. 015004, .
  DOI: 10.1088/2053-1583/abafec
- *Interplay between morphology and magnetoelectric coupling in Fe/PMN-PT multiferroic heterostructures studied by microscopy techniques*
  Motti, F., **Vinai, G.**, Bonanni, V., Polewczyk, V., Mantegazza, P., Forrest, T., Maccherozzi, F., Benedetti, S., Rinaldi, C., Cantoni, M., Cassese, D., Prato, S., Dhesi, S. S., Rossi, G., Panaccione, G., Torelli, P.
  (2020) Physical Review Materials, **4**, art.no. 114418
  DOI: 10.1103/PhysRevMaterials.4.114418
- *Thermal assisted tailoring of magnetic coercivity in Iron thin films on unstable Lithium Niobate substrate*
  Polewczyk, V., **Vinai, G.**, Motti, F., Santhosh, S., Benedetti, S., Rossi, G., Torelli, P.
  (2020) Journal of Magnetism and Magnetic Materials, **515**, art. no. 167257, .
  DOI: 10.1016/j.jmmm.2020.167257
- *Improved Structural Properties in Homogeneously Doped Sm0.4Ce0.6O2-?Epitaxial Thin Films: High Doping Effect on the Electronic Bands*
  Yang, N., Knez, D., **Vinai, G.,** Torelli, P., Ciancio, R., Orgiani, P., Aruta, C.
  (2020) ACS Applied Materials and Interfaces, **12**, pp. 47556-47563.
  DOI: 10.1021/acsami.0c13495
- *Molecular Beam Epitaxy of Two-Dimensional Vanadium-Molybdenum Diselenide Alloys*
  Zhang, L., Yang, T., He, X., Zhang, W., **Vinai, G.**, Tang, C.S., Yin, X., Torelli, P., Feng, Y.P., Wong, P.K.J., Wee, A.T.S.
  (2020) ACS Nano, **14**, pp. 11140-11149.
  DOI: 10.1021/acsnano.0c02124

- *Original design of a patterned multiferroic heterostructure for electrical control of the magnetic shape anisotropy*
  Polewczyk, V., **Vinai, G.**, Motti, F., Dal Zilio, S., Capaldo, P., Sygletou, M., Benedetti, S., Rossi, G., Torelli, P.
  (2020) Journal of Magnetism and Magnetic Materials, **507**, art. no. 166816, .
  DOI: 10.1016/j.jmmm.2020.166816

- *An integrated ultra-high vacuum apparatus for growth and in situ characterization of complex materials*
  **Vinai, G.**, Motti, F., Petrov, A.Y., Polewczyk, V., Bonanni, V., Edla, R., Gobaut, B., Fujii, J., Suran, F., Benedetti, D., Salvador, F., Fondacaro, A., Rossi, G., Panaccione, G., Davidson, B.A., Torelli, P.
  (2020) Review of Scientific Instruments, **91**, art. no. 085109, .
  DOI: 10.1063/5.0005302

- *Proximity-induced ferromagnetism and chemical reactivity in few-layer VSe2 heterostructures*
  **Vinai, G.**, Bigi, C., Rajan, A., Watson, M.D., Lee, T.-L., Mazzola, F., Modesti, S., Barua, S., Ciomaga Hatnean, M., Balakrishnan, G., King, P.D.C., Torelli, P., Rossi, G., Panaccione, G.
  (2020) Physical Review B, **101**, art. no. 035404, .
  DOI: 10.1103/PhysRevB.101.035404

- *Magnetic Transition in Monolayer VSe2 via Interface Hybridization*
  Zhang, W., Zhang, L., Wong, P.K.J., Yuan, J., **Vinai, G.**, Torelli, P., Van Der Laan, G., Feng, Y.P., Wee, A.T.S.
  (2019) ACS Nano, **13**, pp. 8997-9004.
  DOI: 10.1021/acsnano.9b02996

- *Reversible Modification of Ferromagnetism through Electrically Controlled Morphology*
  **Vinai, G.**, Motti, F., Bonanni, V., Petrov, A.Y., Benedetti, S., Rinaldi, C., Stella, M., Cassese, D., Prato, S., Cantoni, M., Rossi, G., Panaccione, G., Torelli, P.
  (2019) Advanced Electronic Materials, **5**, art. no. 1900150
  DOI: 10.1002/aelm.201900150

- *Evidence of Spin Frustration in a Vanadium Diselenide Monolayer Magnet*
  Wong, P.K.J., Zhang, W., Bussolotti, F., Yin, X., Herng, T.S., Zhang, L., Huang, Y.L., **Vinai, G.**, Krishnamurthi, S., Bukhvalov, D.W., Zheng, Y.J., Chua, R., N'Diaye, A.T., Morton, S.A., Yang, C.-Y., Ou Yang, K.-H., Torelli, P., Chen, W., Goh, K.E.J., Ding, J., Lin, M.-T., Brocks, G., de Jong, M.P., Castro Neto, A.H., Wee, A.T.S.
  (2019) Advanced Materials, **31**, art. no. 1901185
  DOI: 10.1002/adma.201901185

- *Magnetic properties of the CoO/Fe(001) system with a bottom-up engineered interface*
  Brambilla, A., Picone, A., Giannotti, D., Calloni, A., Berti, G., Hedayat, H., Carpene, E., Dallera, C., Zani, M., **Vinai, G.**, Torelli, P., Foerster, M., Aballe, L., Finazzi, M., Duò, L., Ciccacci, F.
  (2019) Journal of Magnetism and Magnetic Materials, **475**, pp. 54-59.
  DOI: 10.1016/j.jmmm.2018.11.095

- *Insights into the electronic structure of OsO2 using soft and hard x-ray photoelectron spectroscopy in combination with density functional theory*
  Regoutz, A., Ganose, A.M., Blumenthal, L., Schlueter, C., Lee, T.-L., Kieslich, G., Cheetham, A.K., Kerherve, G., Huang, Y.-S., Chen, R.-S., **Vinai, G.**, Pincelli, T., Panaccione, G., Zhang, K.H.L., Egdell, R.G., Lischner, J., Scanlon, D.O., Payne, D.J.
  (2019) Physical Review Materials, 3 (2), art. no. 025001, .
  DOI: 10.1103/PhysRevMaterials.3.025001

- *Room temperature biaxial magnetic anisotropy in La0.67Sr0.33MnO3 thin films on SrTiO3 buffered MgO (001) substrates for spintronic applications*
  Chaluvadi, S.K., Ajejas, F., Orgiani, P., Rousseau, O., **Vinai, G.**, Petrov, A.Y., Torelli, P., Pautrat, A., Camarero, J., Perna, P., Mechin, L.
  (2018) Applied Physics Letters, 113 (5), art. no. 052403, .
  DOI: 10.1063/1.5020072

- *Bonding Character and Magnetism at the Interface Between Fe and MoS2 Nanosheets*
  Mantovan, R., Matveyev, Y., **Vinai, G.**, Martella, C., Torelli, P., Molle, A., Zarubin, S., Lebedinskii, Y., Zenkevich, A.
  (2018) Physica Status Solidi (A) Applications and Materials Science, **215**, art. no. 1800015, .
  DOI: 10.1002/pssa.201800015
- *Ferroelectric Control of the Spin Texture in GeTe*
  Rinaldi, C., Varotto, S., Asa, M., Sławińska, J., Fujii, J., **Vinai, G.**, Cecchi, S., Di Sante, D., Calarco, R., Vobornik, I., Panaccione, G., Picozzi, S., Bertacco, R.
  (2018) Nano Letters, **18**, pp. 2751-2758.
  DOI: 10.1021/acs.nanolett.7b04829
- *Strain-induced magnetization control in an oxide multiferroic heterostructure*
  Motti, F., **Vinai, G.**, Petrov, A., Davidson, B.A., Gobaut, B., Filippetti, A., Rossi, G., Panaccione, G., Torelli, P.
  (2018) Physical Review B, **97**, art. no. 094423, .
  DOI: 10.1103/PhysRevB.97.094423
- *Interdiffusion-driven synthesis of tetragonal chromium (III) oxide on BaTi O3*
  Asa, M., **Vinai, G.**, Hart, J.L., Autieri, C., Rinaldi, C., Torelli, P., Panaccione, G., Taheri, M.L., Picozzi, S., Cantoni, M.
  (2018) Physical Review Materials, **2**, art. no. 033401, .
  DOI: 10.1103/PhysRevMaterials.2.033401
- *Study of equilibrium carrier transfer in LaAlO3/SrTiO3 from an epitaxial La1-xSrxMnO3 ferromagnetic layer*
  Telesio, F., Moroni, R., Pallecchi, I., Marré, D., **Vinai, G.**, Panaccione, G., Torelli, P., Ruspon, S., Piamonteze, C., Di Gennaro, E., Khare, A., Miletto Granozio, F., Filippetti, A.
  (2018) Journal of Physics Communications, **2**, art. no. 025010, .
  DOI: 10.1088/2399-6528/aaa943
- *Giant magneto-electric coupling in 100 nm thick Co capped by ZnO nanorods*
  **Vinai, G.**, Ressel, B., Torelli, P., Loi, F., Gobaut, B., Ciancio, R., Casarin, B., Caretta, A., Capasso, L., Parmigiani, F., Cugini, F., Solzi, M., Malvestuto, M., Ciprian, R.
  (2018) Nanoscale, **10**, pp. 1326-1336.
  DOI: 10.1039/c7nr09233d
- *Enhanced Magnetic Hybridization of a Spinterface through Insertion of a Two-Dimensional Magnetic Oxide Layer*
  Brambilla, A., Picone, A., Giannotti, D., Calloni, A., Berti, G., Bussetti, G., Achilli, S., Fratesi, G., Trioni, M.I., **Vinai, G.**, Torelli, P., Panaccione, G., Duò, L., Finazzi, M., Ciccacci, F.
  (2017) Nano Letters, **17**, pp. 7440-7446.
  DOI: 10.1021/acs.nanolett.7b03314
- *Influence of Mn diffusion on IrMn thickness threshold for the onset of exchange bias in IrMn/Co bilayers*
  **Vinai, G.**, Frangou, L., Castan-Guerrero, C., Bonanni, V., Gobaut, B., Auffret, S., Prejbeanu, I.L., Dieny, B., Baltz, V., Torelli, P.
  (2017) Journal of Physics: Conference Series, **903**, 012061
  DOI: 10.1088/1742-6596/903/1/012061
- *Quantifying the critical thickness of electron hybridization in spintronics materials*
  Pincelli, T., Lollobrigida, V., Borgatti, F., Regoutz, A., Gobaut, B., Schlueter, C., Lee, T.-L., Payne, D.J., Oura, M., Tamasaku, K., Petrov, A.Y., Graziosi, P., Miletto Granozio, F., Cavallini, M., **Vinai, G.**, Ciprian, R., Backl, C.H., Rossi, G., Taguchi, M., Daimon, H., Van Der Laan, G., Panaccione, G.
  (2017) Nature Communications, **8**, art. no. 16051, .
  DOI: 10.1038/ncomms16051
- *Spectroscopic identification of the chemical interplay between defects and dopants in Al-doped ZnO*
  Benedetti, S., Valenti, I., Di Bona, A., **Vinai, G.**, Castan-Guerrero, C., Valeri, S., Catellani, A., Ruini, A., Torelli, P., Calzolari, A.

(2017) Physical Chemistry Chemical Physics, **19**, pp. 29364-29371.
DOI: 10.1039/c7cp05864k

- *Magnetic anisotropy at the buried CoO/Fe interface*
  Giannotti, D., Hedayat, H., **Vinai, G.**, Picone, A., Calloni, A., Berti, G., Riva, M., Bussetti, G., Boschini, F., Torelli, P., Panaccione, G., Carpene, E., Dallera, C., Finazzi, M., Brambilla, A.
  (2016) Applied Physics Letters, **109**, art. no. 232401, .
  DOI: 10.1063/1.4971291
- *Magnetic gas sensing exploiting the magneto-optical Kerr effect on ZnO nanorods/Co layer system*
  Ciprian, R., Baratto, C., Giglia, A., Koshmak, K., **Vinai, G.**, Donarelli, M., Ferroni, M., Campanini, M., Comini, E., Ponzoni, A., Sberveglieri, G.
  (2016) RSC Advances, **6**, pp. 42517-42521.
  DOI: 10.1039/c6ra00522e
- *New strategy for magnetic gas sensing*
  Ciprian, R., Torelli, P., Giglia, A., Gobaut, B., Ressel, B., **Vinai, G**., Stupar, M., Caretta, A., De Ninno, G., Pincelli, T., Casarin, B., Adhikary, G., Sberveglieri, G., Baratto, C., Malvestuto, M.
  (2016) RSC Advances, **6**, pp. 83399-83405.
  DOI: 10.1039/c6ra18213e
- *Magnetoresistance of galfenol-based magnetic tunnel junction*
  Gobaut, B., **Vinai, G.,** Castán-Guerrero, C., Krizmancic, D., Rafaqat, H., Roddaro, S., Rossi, G., Panaccione, G., Eddrief, M., Marangolo, M., Torelli, P.
  (2015) AIP Advances, **5**, art. no. 127128, .
  DOI: 10.1063/1.4939019
- *Unraveling the magnetic properties of BiFe0.5Cr0.5O3 thin films*
  **Vinai, G.**, Khare, A., Rana, D.S., Di Gennaro, E., Gobaut, B., Moroni, R., Petrov, A.Y., Scotti Di Uccio, U., Rossi, G., Miletto Granozio, F., Panaccione, G., Torelli, P.
  (2015) APL Materials, **3**, art. no. 116107, .
  DOI: 10.1063/1.4935618
- *IrMn microstructural effects on exchange bias variability in patterned arrays of IrMn/Co square dots*
  **Vinai, G.**, Moritz, J., Gaudin, G., Vogel, J., Prejbeanu, I.L., Dieny, B.
  (2014) Journal of Physics D: Applied Physics, **47**, art. no. 195302, .
  DOI: 10.1088/0022-3727/47/19/195302
- *Large exchange bias enhancement in (Pt(or Pd)/Co)/IrMn/Co trilayers with ultrathin IrMn thanks to interfacial Cu dusting*
  **Vinai, G.**, Moritz, J., Bandiera, S., Prejbeanu, I.L., Dieny, B.
  (2014) Applied Physics Letters, **104**, art. no. 162401, .
  DOI: 10.1063/1.4872265
- *Focused Kerr measurements on patterned arrays of exchange biased square dots*
  **Vinai, G.**, Moritz, J., Gaudin, G., Vogel, J., Prejbeanu, I.L., Dieny, B.
  (2014) EPJ Web of Conferences, **75**, art. no. 05003, .
  DOI: 10.1051/epjconf/20147505003
- *Magnetic properties of patterned arrays of exchange-biased IrMn/Co square dots*
  **Vinai, G.**, Moritz, J., Gaudin, G., Vogel, J., Bonfim, M., Lançon, F., Prejbeanu, I.L., Mackay, K., Dieny, B.
  (2013) Journal of Physics D: Applied Physics, **46**, art. no. 345308, .
  DOI: 10.1088/0022-3727/46/34/345308
- *Enhanced blocking temperature in (Pt/Co)3/IrMn/Co and (Pd/Co)3/IrMn/Co trilayers with ultrathin IrMn layer*
  **Vinai, G.**, Moritz, J., Bandiera, S., Prejbeanu, I.L., Dieny, B.
  (2013) Journal of Physics D: Applied Physics, **46**, art. no. 322001, .
  DOI: 10.1088/0022-3727/46/32/322001

- *Large exchange bias field in (Pt/Co) 3/IrMn/Co trilayers with ultrathin IrMn layers*
  Moritz, J., **Vinai, G.**, Dieny, B.
  (2012) IEEE Magnetics Letters, **3**, art. no. 6157817, .
  DOI: 10.1109/LMAG.2012.2184794
- *Two-bit-per-dot patterned media for magnetic storage*
  Moritz, J., Arm, C., **Vinai, G.**, Gautier, E., Auffret, S., Marty, A., Bayle-Guillemaud, P., Dieny, B.
  (2011) IEEE Magnetics Letters, **2**, art. no. 5710454, .
  DOI: 10.1109/LMAG.2010.2098852
- *Two-bit-per-dot patterned media combining in-plane and perpendicular-to- plane magnetized thin films*
  Moritz, J., **Vinai, G.**, Auffret, S., Dieny, B.
  (2011) Journal of Applied Physics, **109**, art. no. 083902,
  DOI: 10.1063/1.3572259