

Dr Adrian Crisan MSc, PhD

Senior Research Fellow. Team Leader, EU Marie Curie Excellence Team "Nano Pinning HTS"

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About

Adrian Crisan is a Senior Research Fellow and leader of an EU Marie Curie Excellence Team working in the field of superconductivity and nanotechnology.

Adrian has published over 110 research papers, had over 70 presentations at international conferences (more than 15 invited talks and lectures) as well as reviews and one chapter in a book; his scientific work resulted in over 400 citations.

He has received major grants from NATO/Royal Society, Science and Technology Agency of the Japanese Government, Japan Society for the Promotion of Science, Romanian Ministry of Education and Research, European Science Foundation and European Commission.

Adrian is a very active member of the Global Network (EU-Japan-USA) Nanoscience and Engineering in Superconductivity, of the European Society of Applied Superconductivity, of the Japanese Society of Applied Physics, and of UK-JSPS Alumni Association.

Qualifications

Phd in Condensed Matter Physics, Institute of Atomic Physics Bucharest, 1994
Msc (Hons) in Engineering Physicist, University of Bucharest, 1985

Biography

Adrian Crisan qualified with an MSc (Hons 1st) in Technological Physics from the University of Bucharest, Romania, in 1985 with a thesis on GaAs/AlGaAs heterostructures laser diodes.

Between 1985-1987 he worked as an Engineering Physicist in the Radiation Detectors R&D group at the Institute for Nuclear Power Reactors Pitesti, Romania.

He joined the National Institute of Materials Physics Bucharest in 1987, studied for a PhD in Condensed Matter Physics (thesis on Superconductivity, viva in 1994) and developed his career in NIMP from Researcher to Senior Scientist Grade 1 (Research Professor).

He has worked in 1997 at University of Southampton (NATO/Royal Society Postdoctoral Research Fellow), in 1998-1999 at University of Rome "Tor Vergata" (Invited Senior Scientist on a grant offered by National Institute of Physics of Matter Italy), in 2000-2002 at the Nanoelectronics Research Institute of AIST Tsukuba Japan (STA Research Fellowships), in 2002-2004 at the University of Bath (PDRA on an EPSRC Grant), and again in 2006 at AIST Tsukuba (JSPS Invitational Fellowship).

In 2006 Adrian was awarded a Marie Curie Excellence Grant of about £1.5 million for his project on self-assembling nanotechnology of pinning centres in superconducting films, for which he chose the University of Birmingham, School of Metallurgy and Materials as host institution.

In 2007 he became the Leader of the MC Excellence team at UoB

Teaching

Programmes:

EngD in Engineered Materials for High Performance Applications in Aerospace and Related Technologies

MRes in Biomaterials

MRes in Materials for Sustainable Energy Technologies

MRes in the Science and Engineering of Materials

Module(s):

Functional Materials

Postgraduate supervision

Adrian is currently supervising (or interested in supervising in the future) doctoral research students in the following areas:

Nanostructured Superconductors

Vortex matter in multi-component superconductors

Nano-rods and nano-wires of oxide functional materials

Thin films for oxide electronics

Research

RESEARCH THEMES:

Fundamental and applied superconductivity

Superconducting thin films

Self-assembled nanotechnology of pinning centres in superconducting films

Vortex matter and dynamics in exotic superconductors

Self-assembled nano-rods and nano-wires from functional oxide materials

Materials for oxide electronics

RESEARCH ACTIVITY:

Self-assembled nanorods and nanowires of oxide functional materials by Pulsed Laser Deposition, using self-assembled gold nano-dots on the substrate as catalyst.

Self-assembling nanotechnology of pinning centres in superconducting thin films. The combination of several nanostructuring approaches allowed for the growth of thick nanostructured superconducting films with highly-improved current-carrying capability, especially in high applied magnetic fields.

Experimental and theoretical studies on vortex dynamics in anomalous and multi-component superconductors.

Studies of vortex matter in 1+1 dimensional vortex systems, in nanostructured superconductors and in thin films by means of high-resolution scanning Hall probe microscopy and local magnetization (Bath, 2002-2004).

Superconducting properties of Cu:1234 and Tl:1234 produced by high-pressure technique and of (Ti,Cu)(Ba,Sr)CaCuO:1223 thin films, effects of heavy-ion and neutron irradiation on the critical current density and irreversibility field in Cu:1234, study of Zn- and Mg-induced pinning centers in the above-mentioned materials, self-assembling growth of nano-scale dots and stripes for inducing extended pinning centers in superconducting thin films and their influence on increasing the critical current density and reduction of the thermally-activated flux motion, vortex melting lines studies using third-harmonic susceptibility (Japan 2000-2002).

fluctuation magnetoconductivity in Bi:2212 films in parallel magnetic field, fabrication of (BaCuO₂)_m/(CaCuO₂)_n artificial superconducting superlattices grown by layer-by-layer PLD, and their characterization: structure, transport properties, vortex dynamics, etc the role of coherent disorder and short wave-length fluctuations in artificial superlattices (Italy 1998-1999)

Publications

'Beautiful' unconventional synthesis and processing technologies of superconductors and some other materials. P.Badica, [A. Crisan](#), G. Aldica, K. Endo, H. Borodianska, K. Togano, S. Awaji, K. Watanabe, Y. Sakka, O. Vasylyk, *Science and Technology of Advanced Materials*, **12**, 013001 (2011).

Pinning potential in thick PrBa₂Cu₃O_x/YBa₂Cu₃O_{7-d} quasi-nanolayers, [A. Crisan](#), V.S. Dang, P. Mikheenko, Y.Y. Tse, A. Sarkar, J. Bowen, J.S. Abell, *Physica C: Superconductivity and its Applications*, **470**, 55-60 (2010).

Critical current density and pinning in Ag/YBa₂Cu₃Ox and PrBa₂Cu₃Oy/YBa₂Cu₃Ox multilayers, V. S. Dang, P. Mikheenko, A. Sarkar, M. M. Awang Kechik, J. S. Abell and [A. Crisan](#), *J. Phys.: Conf. Ser.* **234**, 012010 (2010).

Self-assembled artificial pinning centres in thick YBCO superconducting films, P Mikheenko, J S Abell, A Sarkar, V S Dang, M M Awang Kechik, J L Tanner, P Paturi, H Huhtinen, N Hari Babu, D A Cardwell and [A. Crisan](#), *J. Phys.: Conf. Ser.* **234**, 022022 (2010).

Artificial pinning in thick YBCO films: Pinning potential and c-axis correlation. [A. Crisan](#), [P. Mikheenko](#), [A. Sarkar](#), [V. S. Dang](#), [M. M. Awang Kechik](#), [J. S. Abell](#), [P. Paturi](#), [H. Huhtinen](#), *Physica C: Superconductivity and its Applications*, **470**, 840-843 (2010). (http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TVJ-4YF5R77-5&_user=122868&_coverDate=02%2F20%2F2010&_rdoc=85&_fmt=high&_orig=browse&_srch=docinfo%28%23toc%235536%239999%2399999999%23999999%23FLA%23display%23Articles%29&_cdi=5536&_sort=d&_docanchor=8&_ct=516&_acct=C00010083&_version=1&_urlVersion=0&_userid=122868&md5=a700ffdfbc2532e74aabb1628c6f658), P. Mikheenko, A. Sarkar, V. S. Dang, M. M. Awang Kechik, J. S. Abell, P. Paturi, H. Huhtinen, , 840-843 (2010).

Increased critical current density and pinning in thick Ag/YBa₂Cu₃O_{7-x} multilayers, V. S. Dang, P. Mikheenko, A. Sarkar, M. M. Awang Kechik, J. S. Abell and [A. Crisan](#), *Physica C: Superconductivity and its Applications*, **470**, 1238-1241 (2010).

Topological structure of the interband phase difference soliton in two-band superconductivity, Y. Tanaka, A. Iyo, K. Tokiwa, T. Watanabe, [A. Crisan](#), A. Sundaresan, N. Terada, *Physica C: Superconductivity and its Applications*, **470**, 1010-1012 (2010).

Nanodots induced columnar growth of YBa₂Cu₃O_x films. [P. Mikheenko](#), [J.L. Tanner](#), [J. Bowen](#), [A. Sarkar](#), [V.-S. Dang](#), [J.S. Abell](#), [A. Crisan](#), *Physica C: Superconductivity and its Applications*, **470**, (Suppl. 1), S234-S236 (2010), (http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TVJ-4XNW46J-2&_user=122868&_coverDate=11%2F12%2F2009&_rdoc=319&_fmt=high&_orig=browse&_srch=docinfo%28%23toc%235536%239999%2399999999%23999999%23FLA%23display%23Articles%29&_cdi=5536&_sort=d&_docanchor=8&_ct=516&_acct=C00010083&_version=1&_urlVersion=0&_userid=122868&md5=48032c0d6c41386f0c57fad61d3dbb0), P. Mikheenko, J.L. Tanner, J. Bowen, A. Sarkar, V.-S. Dang, J.S. Abell, , (Suppl. 1), S234-S236 (2010).

Topology of two-band superconductors, Y. Tanaka, A. Iyo, K. Tokiwa, T. Watanabe, [A. Crisan](#), A. Sundaresan, N. Terada, *Physica C: Superconductivity and its Applications*, **470**, (Suppl. 1), S966-S967 (2010).

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Nano Techniques for Enhancing Critical Current in Superconducting YBCO Films, P. Mikheenko, V.S. Dang, M.M. Awang Kechik, Y. Wang, A. Sarkar, J.L. Tanner, J. S. Abell, [A. Crisan](#), *Journal of Superconductivity and Novel Magnetism*, in press, DOI 10.1007/s10948-010-0861-2.

Improved Critical Current Densities in YBa₂Cu₃O_{7-d} Multilayer Films Interspaced with Palladium Nanodots, A. Sarkar, P. Mikheenko, V.S. Dang, M.M. Awang Kechik, J. S. Abell, [A. Crisan](#), *Journal of Superconductivity and Novel Magnetism*, in press, DOI 10.1007/s10948-010-0914-6.

Exotic Vortex Matter: Pancake Vortex Molecules and Fractional-Flux Molecules in Some Exotic and/or Two-Component Superconductors, [A. Crisan](#), Y. Tanaka, A. Iyo, *Journal of Superconductivity and Novel Magnetism*, in press, DOI 10.1007/s10948-010-0892-8.

Improved critical current densities in thick YBa₂Cu₃O_{7-x} multilayer films interspaced with non-superconducting YBa₂Cu₃O_x nanodots, A. Sarkar, V.S. Dang, P. Mikheenko, M.M Awang Kechik, J.S. Abell, [A. Crisan](#), *Thin Solid Films*, **519**, 876-879 (2010).

Synergetic pinning centres in YBa₂Cu₃O_x films through a combination of Ag nano-dot substrate decoration, Ag/YBCO quasi-multilayers, and the use of BaZrO₃-doped target, P. Mikheenko, V.-S. Dang, M. M. Awang Kechik, A. Sarkar, P. Paturi, H. Huhtinen, J. S. Abell and A. Crisan, *IEEE Trans. Appl. Supercond.* Accepted.

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Artificial pinning centres in YBa₂Cu₃O_{7-δ} Thin Films by Gd₂Ba₄CuWO₉ nanophase inclusions, M. M. Awang Kechik, P. Mikheenko, A. Sarkar, V. S. Dang, N. Hari Babu, D. A. Cardwell, J. S. Abell and [A. Crisan](#), *Superconductor Science and Technology*, **22**, 034020 (5pp) (2009), , 034020 (5pp) (2009).

Critical Current Density and Pinning Potential in YBa₂Cu₃O_{7-δ} Thick Films Ablated from a BaZrO₃ – Doped Nanocrystalline Target, [A. Crisan](#), M.M. Awang Kechik, P. Mikheenko, V.S. Dang, J.S. Abell, P. Paturi, H. Huhtinen, *Superconductor Science and Technology*, **22**, 045014 (5pp) (2009), , 045014 (5pp) (2009).

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Vortex molecule, fractional flux quanta, and interband phase difference soliton in multi-band superconductivity and multi-component superconductivity, Y. Tanaka, D.D. Shivagan, [A. Crisan](#), A. Iyo, P.M. Shirage, K. Tokiwa, T. Watanabe, N. Terada, *Journal of Physics: Conference Series*, **150**, 052267 (2009).

Ambiguity in the statistics of single component winding vortex in a two-band superconductor, Y. Tanaka and [A. Crisan](#), *Physica B: Condensed Matter*, **404**, 1033-1039 (2009).

c-Axis correlated extended defects and critical current in YBa₂Cu₃O_x films grown on Au and Ag-nano dot decorated substrates, P. Mikheenko, A. Sarkar, V.-S. Dang, J. L. Tanner, J. S. Abell, and [A. Crisan](#), *Physica C: Superconductivity and its Applications*, **469**, 798-804 (2009).

Pinning centers induced in YBCO films by nano-dots in substrate decoration and quasi-superlattice approaches, P. Mikheenko, A. Sarkar, V.-S. Dang, J. L. Tanner, M.M. Awang Kechik, J. S. Abell, and [A. Crisan](#), *IEEE Transactions on Applied Superconductivity*, **19**(3), 3491-3494 (2009).

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Vortex molecule and i-soliton studies in multilayer cuprate superconductors. D. D. Shivagan, [A. Crisan](#), P.M. Shirage, A. Sundaresan, Y. Tanaka, A. Iyo, K. Tokiwa, T. Watanabe, N. Terada, *Journal of Physics: Conference Series*, **97**, 012212 (2008).

AC-Susceptibility study on vortex-molecule lattice in supermultilayer cuprate HgBa₂Ca_{n-1}Cu_nO_{2n+2+δ} (n = 14). D. D. Shivagan, P. M. Shirage, [A. Crisan](#), Y. Tanaka, A. Iyo, K. Tokiwa, T. Watanabe, N. Terada, *Physica C: Superconductivity and its Applications*, **468**, 1281-1286 (2008).

Phase diagram of a lattice of vortex molecules in multicomponent superconductors and multilayer cuprate superconductors. Y. Tanaka, D. D. Shivagan, [A. Crisan](#), A. Iyo, P.M. Shirage, K. Tokiwa, T. Watanabe, N. Terada, *Superconductor Science and Technology*, **21**, 085011 (17pp) (2008), , 085011 (17pp) (2008).

Manipulation of pancake vortices by rotating a Josephson vortex lattice. [A. Crisan](#), S. J. Bending, T. Tamegai, *Supercond. Sci. Technol.*, **21**, 015017 (2008).

Magnetically coupled pancake vortex molecules in HgBa₂Ca_{n-1}Cu_nO_y (n ≥ 6). [A. Crisan](#), A. Iyo, Y. Tanaka, H. Matsuhata, D.D. Shivagan, P.M. Shirage, K. Tokiwa, T. Watanabe, T.W. Button, J.S. Abell, *Phys. Rev. B*, **77**, 144518 (2008).77, 144518 (2008).

Pancake-vortex molecules in HgBa₂Ca_{n-1}Cu_nO_y (n ≥ 6) superconductors. [A. Crisan](#), A. Iyo, Y. Tanaka, H. Matsuhata, D.D. Shivagan, P.M. Shirage, K. Tokiwa, T. Watanabe, T.W. Button, J.S. Abell, *Physica C: Superconductivity and its Applications*, **468**, 714-717 (2008).

Vortex Dynamics in Hg-based Multi- and Super-Multi-Layered Cuprates. [A. Crisan](#), Y. Tanaka, A. Iyo, D.D. Shivagan, P.M. Shirage, T.W. Button, J.S. Abell, K. Tokiwa, T. Watanabe, *Journal of Physics: Conference Series*, **97**, 012013 (2008).

Critical current densities and irreversibility fields of a HgBa₂Ca_{n-1}Cu_nO_{2n+2+δ} sample containing n = 6–15 phases. P.M. Shirage, A. Iyo, D.D. Shivagan, A. Crisan, Y. Tanaka, Y. Kodama, H. Kito, *Physica C: Superconductivity and its Applications*, **468**, 1281-1290 (2008).

Superconductivity at 108 K in the simplest non-toxic double-layer cuprate of Ba₂Ca₃Cu₄O₈(O, F)₂. P.M. Shirage, D.D. Shivagan, [A. Crisan](#), Y. Tanaka, Y. Kodama, H. Kito and A. Iyo, *Journal of Physics: Conference Series*, **97**, 012163 (2008).

Critical current densities and irreversibility fields of new high-T_c Ba₂Ca₃Cu₄O₈(O, F)₂ superconductor. P.M. Shirage, D.D. Shivagan, [A. Crisan](#), Y. Tanaka, Y. Kodama, H. Kito and A. Iyo, *Physica C: Superconductivity and its Applications*, **468**, 773-776 (2008).

Vortex melting line and dimensional crossover in Ba₂Ca_{n-1}Cu_nO_{2n}(O_{1-y}, F_y)₂ cuprate superconductors. D. D. Shivagan, P. M. Shirage, [A. Crisan](#), Y. Tanaka, A. Iyo, Y. Kodama, K. Tokiwa, T. Watanabe, N. Terada, N. Hamada, *Physica C: Superconductivity and its Applications*, **468**, 749-752 (2008).

Vortex melting line and anisotropy of a Ba₂Ca₃Cu₄O₈(O_{1-y}, F_y)₂ multilayered superconductor. D. D. Shivagan, P. M. Shirage, [A. Crisan](#), Y. Tanaka, A. Iyo, Y. Kodama, K. Tokiwa, T. Watanabe, N. Terada, and N. Hamada, *Superconductor Science and Technology*, **21**, 095002 (7pp) (2008), , 095002 (7pp) (2008).

Thermally-induced self-assembling nanotechnology of gold nano-dots on CeO₂-buffered sapphire for superconducting films. [A. Crisan](#), R. Woerdenweber, E. Hollmann, R. Kutzner, T.W. Button, J.S. Abell, *J. Optoelect. Adv. Mater.*, **10**, 1370-1373 (2008).

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