



## CURRICULUM VITAE

Professor Yuri Kivshar, FAA, FAIP, FOSA, FAPS, FInstP

Head, Nonlinear Physics Center, Research School of Physics and Engineering  
Australian National University

Deputy Director, Center for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS)  
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### Personal Data

Name & Surname: Yuri Kivshar  
Date of Birth & Nationality: 3 April 1959, Dual Nationality: Australia, Ukraine  
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### Education

1976-1981: Study of physics at the National Kharkov University, Ukraine  
1981: Graduated *summa cum laude* with Master of Science in Physics, National Kharkov University, Ukraine  
1981-1984: Graduate studies at the Institute for Low Temperature Physics and Engineering, Ukraine  
1984: Awarded a PhD degree in Physics and Mathematics, Kharkov, Ukraine

### Professional Career

1981: Graduated *summa cum laude* with Master of Science in Physics, National Kharkov University, Ukraine  
1984: Awarded a PhD degree in Physics and Mathematics, Kharkov, Ukraine  
1986: Appointed Research Fellow, Institute for Low Temperature Physics, Kharkov, Ukraine  
1989: Promoted to Senior Research Fellow, Institute for Low Temperature Physics, Kharkov, Ukraine  
1990: Appointed Visiting Professor, Physics Department of the Complutense University, Madrid, Spain  
1991: Awarded Alexander von Humboldt Research Fellowship, University of Düsseldorf, Germany  
1993: Appointed Fellow, Australian National University, Australia  
1994: Promoted to Senior Fellow, Australian National University, Australia  
1999: Promoted to Professor, Australian National University, Australia  
2002: Founded Nonlinear Physics Center, Australian National University, Australia  
2002: Became Deputy Director, Center for Ultrahigh-bandwidth Devices for Optical Systems (CUDOS)  
Australian Research Council, Australia

### Personal Awards

1989: Medal and the First Prize in Physics of the National Academy of Science of the Ukraine  
(under 30 years-old award), Ukraine  
1995: Pnevmatikos International Award for Research in Nonlinear Phenomena  
1998: Pawsey Medal, Australian Academy of Science (under 40 years-old award)  
2000: Fellow, American Optical Society  
2001: Fellow, Australian Academy of Science  
2002: Federation Fellowship, Australian Research Council  
2005: Walter Boas Medal, Australian Institute of Physics  
2006: Carl Zeiss Visiting Professorship, Carl Zeiss and University of Jena (Germany)  
2006: Fellow, American Physical Society  
2007: 2<sup>nd</sup> Federation Fellowship, Australian Research Council  
2007: Lyle Medal, Australian Academy of Sciences (a top award of the AAS)  
2007: Peter Baume Award, Australian National University (a top award of ANU)  
2008: Distinguished Professor, Wenner-Gren Foundation (Sweden)  
2010: Distinguished Professor, Australian National University  
2012: Fellow, Institute of Physics (UK)  
2013: The State Prize of the Ukraine in Science and Technology (Ukraine)  
2014: A.A. Lebedev Medal of the Rozhdestvesky Optical Society (Russia)  
2014: The Harrie Massey Medal and Prize, IOP Institute of Physics (UK)

### Achievements in Research and Impact

Prof. Kivshar is a world leader in nonlinear physics, nonlinear photonics, and physics of metamaterials known as one of the “Most Cited Scientists in Physics” (ISI: **h=87** with 35468 citations, Google Scholar: **h=104** with 50624 citations) who published many high-impact papers in Physical Review Letters (83 papers) and Nature-family journals (15 papers). The main contributions of Prof Kivshar to *nonlinear physics* and *photonics* include many pioneering results on nonlinear localized modes in optical systems, optical solitons and vortices, the study of localization in discrete systems and nonlinear effects in plasmonics and metamaterials. Many of his results have been summarized in 5 books, and his pioneering works on localization were highlighted in an invited article in Physics Today **57**, 43 (2004) and three review papers in Rev. Mod. Phys. (IF=44.982).

Prof. Kivshar has held two consecutive Federation Fellowships granted by the Australian Research Council (ARC), which provided him with the opportunity for full-time research. These fellowships boosted enormously his research potential, creativity and productivity. The first Federation Fellowship helped Prof. Kivshar to establish the Nonlinear Physics Centre (NLPC) with active theoretical and

experimental programs in *nonlinear optics of periodic media* closely connected with the ARC Centre of Excellence for Ultrahigh Bandwidth Devices for Optical Systems CUDOS (established in 2003 for eight years and then funded for another seven years from 2011). Prof. Kivshar's second Federation Fellowship helped him to develop strong *experimental programs in metamaterials* and, more recently, in *nonlinear nanophotonics and all-dielectric metamaterials*.

Through his leadership and own research support, including ARC Discovery and Linkage grants, Prof. Kivshar established the world leading theoretical and experimental group at NLPC and major experimental infrastructure for nonlinear optics and nanophotonics research, including ultrafast laser systems and related characterisation capabilities, as well as Scanning Near-field Optical Microscope with spectral capabilities and sub-100nm spatial resolution that provides new opportunities to carry out cutting-edge experimental research and develop new experimental techniques. Many research projects and publications of NLPC over the last 5 years are either experimental or include both theoretical and experimental studies. The recent experimental achievements of the NLPC team include the first generation of Airy plasmons (highlighted by American Physical Society), the first observation of vortices in liquid crystals (highlighted by Optical Society of America), fabrication of a new generation of out-of-plane metamaterials (highlighted by Nature Photonics), the first prediction and demonstration of Fano resonances in Si oligomers (published in Nano Letters and Small), and the fastest switching at the nanoscale (Nano Letters, 2015). The NLPC team collaborates actively with many experimental groups and hosts numerous visiting researchers.

#### Recent Research Activities and Achievements

Prof. Kivshar was a driving force in a series of experiments carried out at ANU and overseas, which tested and verified many of his theoretical predictions; he personally contributed to a design of experiments and the analysis of the data. Over the last several years Prof. Kivshar's interests shifted towards nanophotonics and optics of composite metal-dielectric *plasmonic structures* with subwavelength light confinement, optical *metamaterials* with strong nonlinear response, and *nonlinear nanophotonics*. Through his own research programs and leadership, he has established major experimental infrastructure for experimental research in nonlinear optics and nanophotonics at the Nonlinear Physics Center. The *recent achievements* in research include:

*Nonlinear metamaterials:* Prof. Kivshar coined the term "nonlinear metamaterial" after revealing a possibility of strong nonlinear response in artificially fabricated metamaterials. This discovery gave a birth to an entirely new class of metamaterials where nonlinearity can be engineered at will; they were followed up by the experimental demonstration of nonlinear magnetic metamaterials, and led to the creation of an entirely new field of physics. Prof. Kivshar's team introduced new techniques to control and manipulate the properties of these novel metamaterials and demonstrated novel ways of their tuning, including the light-induced tuning. An invited review paper on nonlinear metamaterials was published in Rev. Mod Phys, and a book was published by Springer in 2015.

*Fano resonances in nanostructures:* Prof. Kivshar made fundamental contributions to the physics of Fano resonances and their applications in photonics. He developed original approaches for precise control of nonlinear wave scattering and localization in periodic structures, and suggested their practical applications in photonic devices with low threshold all-optical switching functionality. Some of those results are summarised in an invited review paper [Rev. Mod. Phys. **82**, 2257 (2010)] that already attracted over 900 citations. More recently, Prof. Kivshar's team predicted and demonstrated Fano resonances in dielectric oligomers (Small, 2014).

*All-dielectric nanophotonics:* Prof. Kivshar made important contributions to the field of light scattering by small particles. Together with his colleagues, he discovered new regimes of non-Rayleigh scattering of light with inverse wavelength dependence, which explore previously unavailable regimes of scattering by nanoparticles [Phys. Rev. Lett. **100**, 043903 (2008)]. These results disclose new and unexpected features of the Mie scattering by small particles, which were highlighted among the world-wide achievements in optics by *Optics and Photonics News*. His recent results opened a door to a new generation of all-dielectric metamaterials with magnetic resonances induced via Mie scattering (ACS Nano, 2013, Nano Letters, 2015) and will be summarized as an invited review in Science (2016).

#### Plenary and Keynote Talks

Prof. Kivshar's presence as a visitor is in high demand at many research institutions worldwide. Only for 2015-2016, Prof. Kivshar received more than 60 invitations to deliver plenary, keynote, and invited talks at international conferences and workshops. Being in such a high demand creates opportunities for younger members of his group and collaborators as he is not able to attend all those events in person. *Some of the recent plenary, keynote and selected invited talks* include:

(Keynote and 2 invited) SPIE Congress (San Diego, August 2016)  
(Invited) APS March Meeting (Baltimore, March 2016)  
(Keynote) OWTNM Conference (London April 2015)  
(Invited) SPIE Europe (Prague April 2015)  
(Invited) CLEO/QELS USA (San Jose May 2015)  
(Keynote) ICMAT 2015 (Singapore June 2015)  
(Plenary) Metamaterials: Fundamentals and Technology (San Diego July 2015)  
(Plenary) AOM 2015 (Hangzhou China October 2015)  
(Plenary) Photonics Middle East (Doha, December 2015)  
(Plenary) ICO General Congress (Santiago de Compostela, August 2014)  
(Plenary) International Congress Metamaterials'2014 (Copenhagen, August 2014)  
(Plenary) International Conference Laser Optics 2014 (St. Petersburg, July 2014)  
(Keynote) International Conference META 2014 (Singapore, May 2014)

#### Annual Highlights of the Optical Society of America

During the last years, Prof. Kivshar's work was regularly selected for the highly competitive December issues of the Optical Society of America (OSA) magazine "*Optics and Photonics News*" where the most remarkable achievements in optics are summarized at the end of each year (amongst 30-32 peer-reviewed contributions). For example, the last issue "*Optics in 2015*" includes his results on the first subwavelength photonic topological systems. In total, Prof. Kivshar's results have been presented in these special issues *14 times*, and one of these contributions made a cover story.