

Curriculum Vitae of Rachel GRANGE

Head of the Optical Nanomaterial Group, group website www.ong.ethz.ch
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Professional and research activities

- 01/2021 to now **Associate professor at ETH Zurich**, Department of Physics, Institute for Quantum Electronics, Head of the Optical Nanomaterial Group, www.ong.ethz.ch.
- 09/2018 – 12/2020 **Assistant professor** tenure-track at ETH Zurich.
- 1/2015 – 08/2018 **Assistant professor** at ETH Zurich (Financed by SNSF Professor and ERC Starting Grants, non-tenure-track).
- 01/2011 – 12/2014 **Junior group leader** (Carl Zeiss Foundation grant) at the Institute of Applied Physics (IAP), Friedrich Schiller University (FSU) Jena Germany, www.iap.uni-jena.de.
- 10/2007 – 12/2010 **Post-doc** in Prof. Demetri Psaltis group at the Swiss Federal Institute of Technology in Lausanne (EPFL) in the fields of applied nonlinear optics for imaging applications, nano-optics and optofluidic.
- 03/2007 – 12/2010 **Scientific advisor** for the Swiss State Secretariat for Education and Research at the Working Party on Nanotechnology at OECD, Paris. **Country leader** of the business environments project (OECD report published in 2010), www.oecd.org/sti/nano.
- 04/2006 – 09/2007 **Scientific advisor** at the State Secretariat for Education and Research at the Swiss government in Bern.

Education

- 04/2002 – 03/2006 **Ph. D. studies** at ETH Zurich on the characterization of semiconductors saturable absorber mirrors.
- 10/1997 – 03/2002 **Bachelor/Master** (Diploma) in Physics at EPFL.
Master thesis at the Indian Institute of Technology (IIT) in New Delhi.

Institutional responsibilities

- Since 01/2015 Faculty member, Department of Physics, ETH Zurich, Switzerland.
- Since 07/2015 Member of the distinction Committee to select candidate for the PhD thesis ETH medal, Department of Physics, ETH Zurich, Switzerland.

Supervision of graduate students and post-doctoral fellows

- Current team 8 PhD students / 6 post-docs / 2 master students, ETH Zurich, Switzerland.
- PhD thesis director A. Sergeyev, PhD exam 05.12.2016. Flavia Timpu, 31.01.2019, Marc Reig Escalé 28.06.19
- 01/2011 – 12 / 2014 8 master students / 1 PhD student / 1 post-doc, Institute of Applied Physics (IAP), Department of Physics, Friedrich Schiller University (FSU) Jena Germany.

Teaching activities

- Fall sem. 19-20 **Physik 1** for physicists and mathematicians
- Spring sem. 15-18, 21 **Yearly lecture** 'Nanomaterials for Photonics' at ETH Zurich. (20 to 45 students)
- Winter School 2018 Lecturer for the Linné Center on Advanced Optics and Photonics (ADOPT) in Romme Alpin, Sweden on March 22-25 2018.
- Summer School 2016 2 lectures on Plasmonics and Nonlinear Nanomaterials at the 'Perspective on Photonics' Summer school in Gstaad, July 25-29, 2016.
- 15.09.2014 Invited to give a tutorial on nanostructured materials for photonic crystal and plasmonic applications at the European Optical Society Annual Meeting in Berlin.
- 2011 – 2014 Lecture (2 hours ex cathedra and 1 hour of seminar per week during 3 years) for master students at the Abbe School of Photonics.

Committee and Boards

Board member since 2015	Quantum Electronics and Optics Division (QEOD) of the European Physical Society (EPS), qeod.epsdivisions.org
Topical Program committee member	EQEC Programme chair at CLEO-EQEC/Europe in Munich, Germany 2021 TPC member, ECOC , European Conference on Optical Communication 2020 TPC member of Trends in resonant nanophotonics at EOSAM Porto 2020 Nanophotonics at SPIE Photonics Europe 2018-2020, 22-26.04, Strasbourg, France OSA Advanced Photonics Congress 2018, Nonlinear Nanophotonics, Plasmonics, and Metamaterials, 2-5.07.2018, Zurich.
Since 07.2019	Editorial Advisory Board of APL Photonics
Since 01.2020	Editorial Advisory Board of ACS Photonics
Since 02.2020	Editorial Advisory Board of Advanced Optical Materials

Reviewing Activities

Since April 2020 Journals	Topical Editor for Optics Letters , OSA journal Reviewer for Science, Nature Comm, Nano Letters, ACS Nano, ACS Photonics, Optica, Optics Letters, Optics Express, Nanoscale, Laser and Photonics Review, Advanced Functional Materials, OSA Continuum, Journal of Physical Chemistry, Applied Physics Letters
Habilitation Grants	Co-examiner habilitation of Julien Duboisset, Institut Fresnel, Marseille, France Reviewers for national research funding agencies in Finland, Israel, Canada, Belgium, Sweden, France (ANR)

Awards, Fellowships

2019	Top 20 finalist for the Spark Award of the ETH Transfer 'Automatized super-resolution multiphoton polarimetric microscope'
2019	ERC proof of concept grant of the European Research Council (EUR 150k)
2018	Nominated for the Art of Leadership Award (ALEA)
2016	ERC starting grant of the European Research Council (EUR 1.5m)
2014	Humboldt-Research Alumni Award from the Abbe Center of Photonics

Awards by group members directly related to my work

2020	Finalist at the MaP award for the best PhD thesis for Flavia Timpu
2019	Best poster award for Viola Vogler-Neuling at the Science Camp
2019	Early stage entrepreneur award for Maria Timofeeva, SPIE Photonics West
2018	Best poster award for Maria Timofeeva at the MRS fall meeting

Organization of Conferences and Workshops

2020	Founder and Co-organizer of the first Photonics Online Meetup (POM) taking place in (Jan 20, June 20, Jan 21).POM is free and virtual with the aim to reduce the family burden of conference travel, reduce the carbon footprint and cost of participating in conferences, and make conferences more accessible, > 65 hubs on all the continents, more than 1000 attendees, 59 posters on twitter. A report was published on the News of the Department of Physics: An international conference - without flight emissions
2020	Co-organizer of a workshop on Complex Materials for Nonlinear Optics at ETHZ from Jan 29-31 (16 invited speakers, 10 contributed talks, 8 posters)

Memberships

Since 2014	Member of the European Optical Society (EOS)
Since 2011	American Chemical Society (ACS) and European Physical Society (EPS).
Since 2002	Member of the Optical Society of America (OSA).

Selected Achievements

[A] Savo, R., Morandi, A., Müller, J.S., Kaufmann F., Timpu F., Reig Escalé M., Zanini M., Isa L., and Grange R., Broadband Mie driven random quasi-phase-matching. *Nat. Photonics* (2020). <https://doi.org/10.1038/s41566-020-00701-x>

We demonstrated an efficient material for broadband frequency doubling of light using microspheres made of disordered nanocrystals. Instead of a single large crystal one uses an assembly of lots of microcrystals whose individual crystal axes point in random directions. In that way, it is no longer necessary to strictly control the directions of the incoming light beams. Among the many microcrystals there will be some that are oriented favourably and some that are oriented unfavourably, but overall, they will always produce a significant amount of frequency-doubled light.

In the News: ETH News, [Well-formed disorder for versatile light technologies](#)

[B] Timpu, F.; Reig Escalé, M.; Timofeeva, M.; Strkalj, N.; Trassin, M.; Fiebig, M.; **Grange, R.** Enhanced Nonlinear Yield from Barium Titanate Metasurface Down to the Near Ultraviolet. *Adv. Opt. Mater.* 2019, 1900936. <https://doi.org/10.1002/adom.201900936>

Nonlinear metasurfaces have mostly been realized with metals and semiconductors unsuitable for the near ultraviolet (NUV) to the visible range. In this work, we show a new type of nonlinear metasurface with enhanced second-harmonic generation (SHG) in the NUV range fabricated from the barium titanate (BTO), an intrinsically nonlinear material. We combine bottom-up pulse laser deposition to grow a 200 nm BTO thin film with top-down nanofabrication to pattern the nanostructures. We are currently working to render this metasurface active by using the electro-optic effect of BTO.

[C] An Integrated Broadband Spectrometer on Thin-Film Lithium Niobate. *Nat. Photonics* **2019**. <https://doi.org/10.1038/s41566-019-0529-9>.

This work presents a waveguide Fourier transform spectrometer with a recoverable spectral bandwidth of 500 nm in the near infrared. We achieve a much broader bandwidth than typical commercial system (less than 15 nm usually) by using the linear electro-optic effect in lithium niobate without any moving or external parts. The device has a footprint of less than 10 mm². This concept of a compact, broadband spectrometer is of interest for applications where flexibility and versatility are key, like spaceborne spectroscopy and remote sensing or integration in mobile devices.

In the News: ETH News, [Smaller than a coin](#), ETH Globe: [Tiny but precise](#)

[D] Timpu, F.; Hendricks, N. R.; Petrov, M.; Ni, S.; Renaut, C.; Wolf, H.; Isa, L.; Kivshar, Y.; **Grange, R.** Enhanced Second-Harmonic Generation from Sequential Capillarity-Assisted Particle Assembly of Hybrid Nanodimers. *Nano Lett.* 2017, 17 (9), 5381–5388. <https://doi.org/10.1021/acs.nanolett.7b01940>

We show enhanced second-harmonic generation (SHG) from a hybrid metal–dielectric nanodimer consisting of nanoparticle of barium titanate (BaTiO₃) coupled to a metallic gold (Au) nanoparticle. BaTiO₃–Au nanodimers of 100 nm/80 nm sizes are fabricated by sequential capillarity-assisted particle assembly. We use the localized surface plasmon resonance of the gold nanoparticle to enhance the SHG from the BaTiO₃ nanoparticle. We experimentally measure the nonlinear signal from assembled nanodimers and demonstrate an up to 15-fold enhancement compared to a single BaTiO₃ nanoparticle. We further perform numerical simulations of the linear and SHG spectra of the BaTiO₃–Au nanodimer and show that the gold nanoparticle acts as a nanoantenna at the SHG wavelength.