

Assistant Professor

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Groupe de Chimie du Solide – Laboratoire de Physique de la Matière Condensée (CNRS)

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## EDUCATION

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- Sept 2010 – Dec 2013 **Ecole Polytechnique:** Ph.D. in Materials Science  
Laboratoire de Physique de la Matière Condensée (LPMC)  
Thesis title: “Synthesis of anisotropic colloidal nanocrystals and their electro-optical properties”  
Advisor: Thierry Gacoin
- Sept 2006 – Nov 2009 **Ecole Centrale Paris:** M.S. in Chemical Engineering  
Thesis title: “Plasmonic enhancement of luminescent thin film emissions”  
Advisor: Arsène Isambert, Thierry Gacoin
- Feb 2002 – Aug 2006 **Korea Advanced Institute of Science and Technology:** B.S. in Chemical & Biomolecular Engineering  
Advisor: Seung-Bin Park

## PREVIOUS RESEARCH EXPERIENCE

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- Jan 2014 – Dec 2015 **Postdoctoral Researcher: Lawrence Berkeley National Laboratory & University of Texas at Austin**  
*Synthetic- and post-synthetic route for tunable NIR plasmons in doped metal oxide nanocrystals*  
*Vis-NIR dual-mode electrochromism and charge transports in architected nanocomposite thin films*  
*Applications to energy saving smart windows*
- Sept 2010 – Dec 2013 **Ph.D: Ecole Polytechnique - LPMC**  
*Synthesis of size-controlled colloidal lanthanum phosphate nanorods*  
*Spontaneous- and directed assembly of nanorods*  
*Analysis of anisotropic optical properties: birefringence, polarized luminescence etc.*  
*Applications to optical thin films, Kerr cells, and microfluidic methods*
- Dec 2009 – Aug 2010 **Researcher: Korea Institute of Science and Technology (KIST)**  
*Electro-spinning/spraying of metal nanofibers*  
*Dye-sensitized solar cells using Platinum nanofiber web as transparent catalytic electrodes*
- Apr 2009 – Nov 2009 **M.S: Saint Gobain Recherche & Ecole Polytechnique - LPMC**  
*Synthesis of noble metal nanoparticles and immobilization on large area substrates*  
*Plasmonic enhancement of the quantum efficiency of photoluminescence*
- Nov 2008 – Mar 2009 **Intern: Process and Material engineering Lab. (LGPM) – Ecole Centrale Paris**  
*Exobiological organic compounds analyzer by GC-MS for Mission EXOMARS (ESA & NASA)*
- Jun 2007 – Aug 2007 **Intern: SAMSUNG Advanced Institute of Technology (SAIT)**  
*Synthesis of imide-based polymer electrolyte membranes and additives for fuel cells*
- Dec 2005 – Jan 2006 **Intern: LG Chem. Research Park**  
*Heat exchanger and fuel filter designs for portable direct methanol fuel cell (DMFC) systems*
- Jul 2003 – Aug 2003 **Undergraduate researcher: KAIST – Superlattice & Nanomaterials Lab (S-M Yang group)**  
*Size-controlled synthesis of polystyrene nanospheres by emulsion copolymerization*

## CURRENT RESEARCH INTEREST

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### Emerging properties of nanoscale materials and their applications to optical, energy, and biomedical systems

- Synthesis and assembly of nanoparticles (ex. lanthanide phosphors, plasmonic metal oxides)
- Dynamic optical and electrochemical properties of nanomaterials and devices
- Anisotropic physical- and chemical properties in structurally anisotropic nanomaterials
- Nanorod dynamics in fluids – Novel tools for microfluidic analysis – Biomedical applications
- Energy saving electrochromic smart windows based on plasmonic nanoparticles

## TEACHING

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Jan 2016 – present	<b>Quantum Mechanics I (Phy361)</b> – Undergraduate, Every spring semester
	<b>Materials Design (Phy570)</b> – Master 1, Every fall semester
	<b>Functional thin films and active surfaces (Phy582)</b> – Master 1, Every fall semester
	<b>Inorganic chemistry - “Nanoparticles” (Univ. Paris 11)</b> – Master 2, Every fall semester

## HONORS & AWARDS

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2015	<b>Winner for Distinguished Young Scholars’ Seminar (DYSS) – Univ. of Washington</b>
2014	<b>Prix de these (PhD) – École polytechnique</b>
Sept 2010 – Sept 2013	<b>‘Gaspard Monge’ scholarship – Ecole Polytechnique</b>
Sept 2006 – Aug 2009	<b>‘Blaise Pascal’ excellence scholarship – French Ministry of Foreign Affairs</b>
Fev 2002 – Aug 2006	<b>Scholarship from Korea Ministry of Patriots &amp; Veterans Affairs</b>
2003	<b>LG Chem. fellowship</b>

## PUBLICATIONS

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Contact authors are marked with \*

- Y. Cheref, F Lochon, L Daugas, C C-Langavant, E Larquet, A Baron, T Gacoin, **J Kim\*** “Dual-band LSPR of tungsten bronze nanocrystals tunable over NIR and SWIR ranges” *Under review in Nature Communications*. (2022)
- Z. Wang, F Delille, S Bartier, T Pons, N Lequeux, B Louis, **J Kim\***, T Gacoin\* “Zwitterionic Polymers towards the Development of Orientation-Sensitive Bioprobes” *Under review in Langmuir*. (2022)
- R Chacón, A Leray, JM Kim, K Lahlil, A Bouhelier, **J Kim**, T Gacoin, G Colas des Francs\* “Vectorial probing of electric and magnetic transitions in variable optical environments and vice-versa” *Nanotechnology*. 33, 38, 385705 (2022)
- JM Kim, R Chacón, Z Wang, E Larquet, K Lahlil, A Leray, G Colas des Francs, **J Kim\***, T Gacoin “Measuring 3D Orientation of Nanocrystals via Polarized Luminescence of Rare-Earth Dopants” *Nature Communications*. 12, 1943 (2021)
- Z. Wang, JM Kim, L. Magermans, F. Corbella, I. Florea, E. Larquet, **J Kim\***, T Gacoin\* “Monazite LaPO<sub>4</sub>:Eu<sup>3+</sup> nanorods as strongly polarized nano-emitters” *Nanoscale*. doi.org/10.1039/D1NR04639J (2021)
- JM Kim, K Lahlil, T Gacoin\*, **J Kim\***, “Measuring the order parameter of vertically aligned nanorod assemblies” *Nanoscale*. 13, 16, 7630 (2021)
- R Chacon, A Leray, JM Kim, K Lahlil, S Mathew, A Bouhelier, **J Kim**, T Gacoin, G Colas Des Francs\* “Measuring the Magnetic Dipole Transition of Single Nanorods by Spectroscopy and Fourier Microscopy” *Physical Review Applied*. 14, 5, 054011 (2020)
- A Kumar, JM Kim, K Lahlil G Julie, S N Chormaia, **J Kim**, T Gacoin, J Fick\* “Optical trapping and orientation-resolved spectroscopy of europium-doped nanorods” *Journal of Physics: Photonics*. 2, 2, 025007 (2020)
- E Chaudan, **J Kim\***, S Tusseau-Nenez, P Goldner, O L Malta, J Peretti, T Gacoin\* “Polarized luminescence of anisotropic LaPO<sub>4</sub>:Eu nanocrystal polymorphs” *Journal of American Chemical Society*. 140, 9512-9517 (2018)
- BH Kim, CM Stallar, SH Cho, S Heo, CE Garrison, **J Kim**, D J Milliron\* “High mobility in nanocrystal-based transparent conducting oxide thin films” *ACS Nano*. 12, 3200-3208 (2018)
- J Kim\***, S Michelin, M Hilbers, L Martinelli, E Chaudan, G Amselem, E Fradet, J-P Boilot, A M Brouwer, C N Baroud, J Peretti, T Gacoin\* “Monitoring the orientation of rare-earth doped nanorods for flow shear tomography” *Nature Nanotechnology*. 12, 914-919 (2017)
- S Heo, **J Kim**, G K Ong, D J Milliron\*, “Template-free mesoporous electrochromic films on flexible substrates from tungsten oxide nanorods” *Nano Lett*. 17, 5756-5761 (2017)
- J Kim\***, A Agrawal, F Krieg, A Bergerud, D J Milliron\*, “The interplay of Shape and Crystalline Anisotropies in Plasmonic Semiconductor Nanocrystals” *Nano Lett*. 16, 3879-3884 (2016) – *ACS editor’s choice*
- Y Wang, **J Kim**, Z Gao, O Zandi, S Heo, P Banerjee, D J Milliron\*, “Disentangling photochromism and electrochromism by blocking hole transfer at the electrolyte interface” *Chem Mater*. 28 (20), 7198-7202 (2016) – *Co-first authored*
- J Kim**, G K Ong, Y Wang, G LeBlanc, T E Williams, T M. Mattox, B A Helms, D J Milliron\*, “Nanocomposite architecture for rapid, spectrally-selective electrochromic modulation of solar transmittance” *Nano Lett*. 15, 5574-5579 (2015)

A de la Cotte, P Merzeau, **J Kim**, K Lahlil, J-P Boilot, T Gacoin, E Grelet\*, "Electric field induced birefringence in non-aqueous dispersions of mineral nanorods" *Soft Matter*. 11, 6595-6603 (2015)

**J Kim**, K Lahlil, J-P Boilot, T Gacoin, J Peretti\*, "Optimized combination of intrinsic and form birefringence in highly-aligned LaPO<sub>4</sub> nanorods thin films and solutions" *Appl. Phys. Lett.* 105, 061102 (2014)

**J Kim**, J Peretti, K Lahlil, J-P Boilot, T Gacoin\*, "Optically anisotropic thin films by shear-oriented assembly of colloidal nanorods" *Adv. Mater.* 25, 3295-3300 (2013)

**J Kim**, J Kang, U Jeong, H Kim, H Lee\*, "Catalytic, conductive, and transparent platinum nanofiber webs for FTO-free dye-sensitized solar cells" *ACS Appl. Mater. Interfaces*. 5 (8), 3176–3181 (2013)

**J Kim**, A de la Cotte, R Deloncle, S Archambeau, C Biver, J-P Cano, K Lahlil, J-P Boilot, E Grelet, T Gacoin\*, "LaPO<sub>4</sub> mineral liquid crystalline suspensions with outstanding colloidal stability for electro-optical applications" *Adv. Funct. Mater.* 22, 4949–4956 (2012)

**J Kim\***, G Dantelle, A Revaux, M Bérard, A Huignard, T Gacoin\*, J-P Boilot, "Plasmon-induced modification of fluorescent thin film emission nearby gold nanoparticle monolayers" *Langmuir* 26 (11), 8842-8849 (2010)

## **PATENTS**

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"Revêtement composite de contrôle solaire à base de nanocristaux de bronzes de tungstène dispersés dans une matrice sol-gel à base de silice" (*In process of application*)

"Procédé d'étude de l'interaction d'un échantillon cellulaire avec un milieu fluide"  
(FR 2110013)

"Procédé de synthèse de suspensions colloïdales de nano-batônnets"  
(FR 2109316)

"Electrochromic electrodes and methods of making and use thereof"  
(US. Application No. 62-328755)

"Fabrication process of solid mineral transparent and birefringent thin film and optical component of the same"  
(FRA I257I85 /US. 9389353 B2)

"Dye sensitized solar cell and method for manufacturing the same"  
(10-2010-0095139 KR)