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Peer Reviewed Journal Articles

Leary, R. K. & Midgley, P. A. (2016) Analytical Electron Tomography. *MRS Bulletin* **41**(7): 531-536.

Leary, R. K., Kumar, A., Straney, P.J., Collins, S.M., Yazdi, S., Dunin-Borkowski, R. E., Midgley, P. A., Millstone, J. E. & Ringe, E. (2016) Structural and Optical Properties of Discrete Dendritic Pt Nanoparticles on Colloidal Au Nanoprisms. *The Journal of Physical Chemistry C* doi:10.1021/acs.jpcc.6b02103.

Furnival, T., Leary, R. K. & Midgley, P.A. (2016) Denoising time-resolved microscopy image sequences with singular value thresholding. *Ultramicroscopy* doi:10.1016/j.ultramic.2016.05.005.

Thomas, J. M. & Leary, R. K. (2016) On Choosing the Most Appropriate Catalysts for the Conversion of Carbon Dioxide to Fuels and Other Commodities, and on the Environmentally Benign Processing of Renewable and Non-Renewable Feedstocks. *Applied Petrochemical Research* doi:10.1007/s13203-016-0167-9.

Chen, Z., Pronkin, S., Fellingner, T. P., Kailasam, K., Vilé, G., Albani, D., Krumeich, F., Leary, R.K., Barnard, J., Thomas, J. M., Pérez-Ramírez, J., Antonietti, M. & Dontsova, D. (2016) Merging Single Atom Dispersed Silver and Carbon Nitride to a Joint Electronic System via Co-Polymerization with Silver Tricyanomethanide. *ACS Nano* **10**(3): 3166-3175.

Gill, A. M., Hinde, C. S., Leary, R. K., Potter, M. E., Jouve, A., Wells, P. P., Midgley, P. A., Thomas, J. M., Raja, R. (2016) Design of Highly Selective Pt Nanoparticle Catalysts for Aerobic Oxidation of KA-Oil using Continuous-Flow Chemistry. *ChemSusChem* **9**(5): 423-427.

Saghi, Z., Divitini, G., Winter, B., Leary, R., Spiecker, E., Ducati, C., Midgley, P. A. (2016) Compressed sensing electron tomography of needle-shaped biological specimens – Potential for improved reconstruction fidelity with reduced dose. *Ultramicroscopy* **160** 230-238.

Thomas, J. M., Leary, R. K., Eggeman, A. S. & Midgley, P. A. (2015) The rapidly changing face of electron microscopy. *Chemical Physics Letters* **631-632**: 103-113.

Saghi, Z., Benning, M., Leary, R., Macias-Montero, M., Borrás, A. & Midgley, P. A. (2015) Reduced-dose and high-speed acquisition strategies for multi-dimensional electron microscopy. *Advanced Structural and Chemical Imaging* **1**:7.

Yeoh, C. S. M., Rossouw, D., Saghi, Z., Burdet, P., Leary, R. K. & Midgley, P. A. (2015) The Dark Side of EDX Tomography: Modeling Detector Shadowing to Aid 3D Elemental Signal Analysis. *Microscopy and Microanalysis* **21**(3): 759-764.

Thomas, J. M. & **Leary, R. K.**, (2014) A major advance in characterizing nanoporous solids using a complementary triad of existing techniques. *Angewandte Chemie Int. Ed.* **53**: 12020-12021.

Nicoletti, O., de la Peña, F., **Leary, R. K.**, Holland, D. J., Ducati, C. & Midgley, P. A. (2013) Three-dimensional imaging of localized surface plasmon resonances of metal nanoparticles. *Nature* **502**: 80–84.

Leary, R., Saghi, Z., Midgley, P. A. & Holland, D. J. (2013) Compressed sensing electron tomography. *Ultramicroscopy* **131**: 70-91.

Leary, R., de la Peña, F., Barnard, J. S., Luo, Y., Armbrüster, M., Thomas, J. M. & Midgley, P. A. (2013) Revealing the atomic structure of intermetallic GaPd₂ nanocatalysts by using aberration-corrected scanning transmission electron microscopy. *ChemCatChem* **5**(9): 2599-2609.

Thomas, J. M., Ducati, C. D., **Leary, R.** & Midgley, P. A. (2013) Some turning points in the chemical electron microscopic study of heterogeneous catalysts. *ChemCatChem* **5**(9): 2560-2579.

Thomas, J. M., Midgley, P. A. , Ducati, C. D. & **Leary, R. K.** (2013) Nanoscale electron tomography and high-resolution electron microscopy of nanoparticles and nanoclusters: a short survey. *Progress in Natural Science: Materials International* **23**(3): 222-234.

Thomas, J. M., **Leary, R.**, Midgley, P. A. & Holland, D. J. (2013) A new approach to the investigation of nanoparticles: electron tomography with compressed sensing. *Journal of Colloid and Interface Science* **392**: 7–14.

Leary, R., Midgley, P. A. & Thomas J. M. (2012) Recent advances in the application of electron tomography to materials chemistry. *Accounts of Chemical Research* **45**(10): 1782-1791.

Leary, R., Saghi, Z., Armbrüster, M., Wowsnick, G., Schlögl, R., Thomas, J. M. & Midgley, P. A. (2012) Quantitative high-angle annular dark-field scanning transmission electron microscope (HAADF-STEM) tomography and high resolution electron microscopy of unsupported intermetallic GaPd₂ catalysts. *Journal of Physical Chemistry C* **116**(24): 13343-13352.

Saghi, Z., Holland, D. J., **Leary, R.**, Falqui, A., Bertoni, G., Sederman, A. J., Gladden, L. F. & Midgley, P. A. (2011) Three-dimensional morphology of iron oxide nanoparticles with reactive concave surfaces. A compressed sensing-electron tomography (CS-ET) approach. *Nano Letters* **11**(11): 4666-4673.

Leary, R. & Westwood, A. (2011) Carbonaceous nanomaterials for the enhancement of TiO₂ photocatalysis. *Carbon* **49**(3): 741-772.

Leary, R. & Brydson, R. (2011) Chromatic aberration correction: the next step in electron microscopy. *Advances in Imaging and Electron Physics*. P. W. Hawkes (ed.), Elsevier. Vol. 165: 73-130.

Earl, J. S., **Leary, R. K.**, Muller, K. H., Langford, R. M. & Greenspan, D. C. (2011) Physical and chemical characterization of dentine surface following treatment with NovaMin technology. *The Journal of Clinical Dentistry* **22**(3): 62-67.

Leary, R. K., Merson, E., Birmingham, K., Harvey, D. & Brydson, R. (2010) Microstructural and microtextural analysis of InterPulse GTCAW welds in Cp-Ti and Ti-6Al-4V *Materials Science and Engineering: A* **527**(29-30): 7694-7705.

Earl, J. S.,* **Leary, R. K.**,* Perrin, J. S., Brydson, R., Harrington, J. P., Markowitz, K. & Milne, S. J. (2010) Characterization of dentine structure in three dimensions using FIB-SEM. *Journal of Microscopy* **240**(1): 1-5. (*Equal author contributions).

Peer-Reviewed Conference Papers

Leary R. K. (2016) Electron Tomography at the Frontiers of Materials Chemistry. *16th European Microscopy Congress*, 28th August-2nd September, Lyon, France; DOI: 10.1002/EMC2016.0035.

Johnstone, D. N., **Leary, R. K.**, Eggeman, A. S., Hodge, S., Sassi, U., De Fazio, D., Ferarri, A. C. & Midgley, P. A. (2016) Structure and topology of chemical vapour deposited graphene by scanning electron diffraction. *16th European Microscopy Congress*, 28th August-2nd September, Lyon, France; DOI: 10.1002/EMC2016.0592.

de la Peña, F., Ostaševičius, T., **Leary, R. K.**, Ducati, C., Midgley, P. A. & Arenal, R. (2016) Quantitative elemental and bonding EELS tomography of a complex nanoparticle. *16th European Microscopy Congress*, 28th August-2nd September, Lyon, France; DOI: 10.1002/EMC2016.0913.

Muecke-Herzberg, D., Abellan, P., Sarahan, M., Godfrey, I., Zaghi, Z., **Leary, R. K.**, Stevens, A., Ma, J., Kutyniok, G., Azough, F., Freer, R., Midgley, P. A., Browning, N. D. & Ramasse, Q. M. (2016) A compressive sensing based acquisition design for quantitative ultra-low dose high-resolution imaging and spectroscopy in the STEM. *16th European Microscopy Congress*, 28th August-2nd September, Lyon, France; DOI: 10.1002/EMC2016.0216.

Ritz, R., Huth, M., Ihle, S., Schmidt, J., Simson, M., Soltau, H., Johnstone, D. N., **Leary, R. K.**, Midgley, P. A., Duchamp, M., Migunov, V., Dunin-Borkowski, R. E., Ryll, H. & Strüder, L. (2016) Scanning electron diffraction using the pnCCD (S)TEM Camera. *16th European Microscopy Congress*, 28th August-2nd September, Lyon, France; DOI: 10.1002/EMC2016.0163.

Furnival, T., **Leary, R.** Tyo, E. C., Thomas, J. M., Bristowe, P. D. & Midgley, P. A. (2016) Time-resolved imaging and analysis of single atom diffusion on graphene oxide. *16th European Microscopy Congress*, 28th August-2nd September, Lyon, France.

Furnival, T., Schmidt, E., **Leary, R.**, Knez, D., Hofer, F., Bristowe, P. D. & Midgley P. A. (2016) STEM imaging of atom dynamics: novel methods for accurate particle tracking. *16th European Microscopy Congress*, 28th August-2nd September, Lyon, France.

Muecke-Herzberg, D., Abellan, P., Sarahan, M., Godfrey, I., Zaghi, Z., **Leary, R. K.**, Stevens, A., Ma, J., Kutyniok, G., Azough, F., Freer, R., Midgley, P. A., Browning, N. D. & Ramasse, Q. M. (2016) Practical Implementation of Compressive Sensing for High-Resolution STEM. *Microscopy & Microanalysis*, 24th-28th July, Columbus, OH, USA.

Saghi, Z., Einsle, J., Blukis, R., Strodahs, A., **Leary, R.**, Burdet, P., Harrison, R. & Midgley P. A. (2016) Improved Data Analysis and Reconstruction Methods for EDX Tomography. *Microscopy & Microanalysis*, 24th-28th July, Columbus, OH, USA.

Rossouw, D., Krakow, R., Saghi, Z., Yeoh, C. S. M., Burdet, P., **Leary, R. K.** & Midgley, P. A. (2015) Machine Learning Aided Analysis of a Nickel-Based Superalloy. *Microscopy and Microanalysis* **21**(S3): 2173-2174.

Leary, R., de la Peña, F., Barnard, J. S., Luo, Y., Armbrüster, M., Thomas, J. M. & Midgley, P. A. (2014) Revealing intricacies of nano-sized intermetallic GaPd₂ nanocatalysts. *Acta Cryst.* **A70**: C734.

Leary, R., de la Peña, F., Barnard, J. S., Luo, Y., Armbrüster, M., Thomas, J. M. & Midgley, P. A. (2013) Intermetallic GaPd₂ nanocatalysts revealed using aberration-corrected scanning transmission electron microscopy. *11th European Congress on Catalysis – EuropaCat-XI*, Lyon, France, 1st-6th September.

Leary, R., Saghi, Z., Midgley, P. A. & Holland, D. J. (2013) Compressed Sensing Electron Tomography: Theory and Applications. *Microscopy & Microanalysis*, 4th-8th August, Indianapolis, IN, USA.

Leary, R., Saghi, Z., Midgley, P. A. & Holland, D. J. (2013) Compressed Sensing Reconstruction of Smooth Signals in Electron Tomography. *Microscopy & Microanalysis*, 4th-8th August, Indianapolis, IN, USA.

Leary, R., de la Peña, F., Barnard, J. S., Walls, M., Luo, Y., Armbrüster, M., Thomas, J. M. & Midgley, P. A. (2013) Nano-Sized Intermetallics: Unravelling Intricacies of GaPd₂ Catalysts Using Aberration-Corrected STEM. *Microscopy & Microanalysis*, 4th-8th August, Indianapolis, IN, USA.

Leary, R. K., *et al.* (2012) Exploiting sparsity at the nanoscale: a compressed sensing approach to electron tomography. *15th European Microscopy Congress*, Manchester Central, UK, 16th - 21st September.

Leary, R. K., Saghi, Z., Armbrüster, M., Wowsnick, G., Schlögl, R., Thomas, J. M. & Midgley, P. A. (2012) Structural intricacies of unsupported intermetallic Ga-Pd catalyst nanoparticles studied by high resolution and three-dimensional electron microscopy. *15th European Microscopy Congress*, Manchester Central, UK, 16th - 21st September.

de la Peña, F., Nicoletti, O., **Leary, R. K.**, Midgley, P. A. & Ducati, C. (2012) Mapping substrate-induced hybridised surface plasmon resonances of a silver nanocube using machine learning methods. *15th European Microscopy Congress*, Manchester Central, UK, 16th - 21st September.

Nicoletti, O., **Leary, R. K.**, de la Peña, F., Holland, D. J., Ducati, C. & Midgley, P. A. (2012) Three-dimensional imaging of localized surface plasmon resonances of metal nanoparticles. *15th European Microscopy Congress*, Manchester Central, UK, 16th - 21st September.

Midgley, P. A., Saghi, Z., Hindson, J., **Leary, R.**, Holland, D., Sederman, A., Gladden, L., Schmidt, V. & Greenham, N. (2011) Recent developments in quantitative electron tomography. *Microscopy and Microanalysis* **17**(SupplementS2): 932-933.

Leary, R. & Brydson, R. (2010) Characterisation of ESEM conditions for specimen hydration control. *Journal of Physics: Conference Series* **241**(1): 012024.

Leary, R., Merson, E. & Brydson, R. (2010). Microtextures and grain boundary misorientation distributions in controlled heat input titanium alloy fusion welds. *Journal of Physics: Conference Series* **241**(1): 012103.

Palizdar, Y., Cochrane, R. C., Brydson, R., **Leary, R.** & Scott, A. J. (2010). Accurate analysis of EBSD data for phase identification. *Journal of Physics: Conference Series* **241**(1): 012104.

Conference Presentations and Seminars

Leary, R. K. (2016) Principles and practice of electron tomography, *Royal Microscopical Society Electron Microscopy Summer School*, 10th-15th July, University of Leeds, UK. **(Invited)**

Leary, R., (2016) Advanced Signal Recovery in Electron Microscopy: Compressed Sensing Electron Tomography and Beyond. *Canadian Center For Electron Microscopy Summer School on Advanced Electron Microscopy* 29th May-3rd June, McMaster University, Hamilton, Ontario, Canada. **(Invited)**

Leary, R. K., (2016) Novel Methods and Applications of High-Resolution and Multi-Dimensional Electron Microscopy. *Materials Science & NanoEngineering (MSNE) Seminar Series*, 21st April, Rice University, Houston, TX, USA. **(Invited)**

Eggeman, A.S., **Leary, R.K.**,* Johnstone, D. & Midgley, P. A. (2016) Mapping the crystal morphology of graphene oxide with scanning electron diffraction. *Electron Microscopy and Analysis Group Conference*, 6-8th April, University of Durham, UK. (*Presenting author)

Leary, R. K. (2016) Multi-Dimensional Electron Microscopy. *Big Data, Multimodality & Dynamic Models in Biomedical Imaging*, 9th March, Isaac Newton Institute, Cambridge.

Leary, R. K., Kumar, A., Straney, P.J., Collins, S.M., Yazdi, S., Dunin-Borkowski, R. E., Midgley, P. A., Millstone, J. E. & Ringe, E. (2016) Structural and Optical Properties of Discrete Dendritic Pt Nanoparticles on Colloidal Au Nanoprisms. *European Network for Electron Microscopy (ESTEEM2) 2nd Scientific Meeting*, 29th February & 1st March, Düsseldorf, Germany.

Leary, R. K. (2015) Novel Methods and Applications of High-Resolution and Multi-Dimensional Electron Microscopy. *Ernst Ruska-Centre (ER-C) for Microscopy and Spectroscopy with Electrons*, 22nd October, Jülich Research Centre, Germany. **(Invited)**

Leary, R.K. (2015) Principles and Practice of Electron Tomography. *Electron Microscopy Centre Grand Opening Conference and Workshop*, Rice University, Houston, USA, 21st-22nd Spetember. **(Invited)**

Leary, R.K., Saghi, Z., Furnival, T., de la Peña F. & Midgley, P. A. (2015) Compressed Sensing (and Related Methods) for Electron Microscopy. *15th Frontiers of Electron Microscopy in Materials Science (FEMMS) Conference*, Lake Tahoe, USA, 13th-18th September. **(Invited)**

Leary, R.K., Saghi, Z., de la Peña F. & Midgley, P. A. (2015) Compressed Sensing and Related Methods for Electron Tomography. *European Workshop on Electron Tomography (ESTEEM2)*, University of Antwerp, Belgium, 4th-5th June. **(Invited)**

Leary, R. K. (2015) Principles and practice of electron tomography, *Royal Microscopical Society Electron Microscopy Spring School*, 22nd-27th March, University of Leeds, UK. **(Invited)**

Leary, R., Thomas, J. M. & Midgley, P. A. (2014) Atomic-scale and three-dimensional transmission electron microscopy of nanocatalysts. *3rd International Conference on Advanced Electron Microscopy for Catalysis and Energy Storage Materials – EMCat 2014*, Seon Monastery, Germany, 3rd-6th September. **(Invited)**

Leary, R. (2014) Contemporary electron tomography for materials science. *Integrated Imaging Initiative Workshop on Tomography and Ptychography*, Argonne National Laboratory, USA, 29th-30th September. **(Invited)**

Leary, R., de la Peña, F., Barnard, J. S., Luo, Y., Armbrüster, M., Thomas, J. M. & Midgley, P. A. (2014) Revealing intricacies of nano-sized intermetallic GaPd₂ nanocatalysts. *23rd Congress and General Assembly of the International Union of Crystallography (IUCr 2014)*, 5th-8th August, Montreal, Quebec, Canada. **(Invited)**

Leary, R. K. (2014) Principles and practice of electron tomography, *Royal Microscopical Society Electron Microscopy Spring School*, 31st March-4th April, University of Leeds, UK. **(Invited)**

Leary, R., de la Peña, F., Barnard, J. S., Luo, Y., Armbrüster, M., Thomas, J. M. & Midgley, P. A. (2013) Intermetallic GaPd₂ nanocatalysts revealed using aberration-corrected scanning transmission electron microscopy. *11th European Congress on Catalysis – EuropaCat-XI*, Lyon, France, 1st-6th September.

Leary, R., Saghi, Z., Midgley, P. A. & Holland, D. J. (2013) Compressed Sensing Electron Tomography: Theory and Applications. *Microscopy & Microanalysis*, 4th-8th August, Indianapolis, IN, USA.

Leary, R., Saghi, Z., Midgley, P. A. & Holland, D. J. (2013) Compressed Sensing Reconstruction of Smooth Signals in Electron Tomography. *Microscopy & Microanalysis*, 4th-8th August, Indianapolis, IN, USA.

Leary, R., de la Peña, F., Barnard, J. S., Walls, M., Luo, Y., Armbrüster, M., Thomas, J. M. & Midgley, P. A. (2013) Nano-Sized Intermetallics: Unravelling Intricacies of GaPd₂ Catalysts Using Aberration-Corrected STEM. *Microscopy & Microanalysis*, 4th-8th August, Indianapolis, IN, USA.

Leary, R. K. (2013) Principles and practice of electron tomography, *Royal Microscopical Society Electron Microscopy Summer School*, 8th-12th July, University of Leeds, UK. **(Invited)**

Leary, R. K., *et al.* (2012) Exploiting sparsity at the nanoscale: a compressed sensing approach to electron tomography. *15th European Microscopy Congress*, Manchester Central, UK, 16th - 21st September.

Leary, R. K., Saghi, Z., Armbrüster, M., Wowsnick, G., Schlögl, R., Thomas, J. M. & Midgley, P. A. (2012) Structural intricacies of unsupported intermetallic Ga-Pd catalyst nanoparticles studied by high

resolution and three-dimensional electron microscopy. *15th European Microscopy Congress*, Manchester Central, UK, 16th - 21st September.

Leary, R. K. (2012) Principles and practice of electron tomography, *Royal Microscopical Society Electron Microscopy Spring School*, 26th-30th March, University of Leeds, UK. **(Invited)**

Leary, R. K., Saghi, Z., Sederman, A. J., Thomas, J. M., Gladden L. F. Armbrüster, M., Schlögl, R., Midgley, P. A. & Holland, D. J. (2012) Compressed sensing electron tomography for 3D nanometrological studies of complex nanoparticle catalyst systems, *2nd International Symposium on Advanced Electron Microscopy for Catalysis and Energy Storage Materials*, 5-8th February, Fritz Haber Institute of the Max Planck Society, Germany.

Leary, R. K., Saghi, Z., Armbrüster, M., Schlögl, R., Thomas, J. M. & Midgley, P. A. (2011) Quantitative HAADF-STEM tomography of unsupported intermetallic Ga-Pd catalysts, *Electron Microscopy and Analysis Group Conference*, 6-9th September, University of Birmingham, UK.

Leary, R. K. (2011) Principles and practice of electron tomography, *Royal Microscopical Society Electron Microscopy Summer School*, 4th-8th July, University of Leeds, UK. **(Invited)**

Leary, R. K., Saghi, Z., Armbrüster, M., Schlögl, R., Thomas, J. M. & Midgley, P. A. (2011) HAADF-STEM tomography of unsupported intermetallic Ga-Pd catalysts, *Canadian Centre for Electron Microscopy Summer School on Electron Microscopy*, 13-17th June, McMaster University, Canada.

Leary, R. K., Walshaw, R. D., & Brydson, R. (2010) Direct humidity sensing for ESEM, *Royal Microscopical Society Microscience Conference*, 29th June-1st July, Excel Centre, London.

Leary, R. K., Earl, J. S., Perrin, J. S., Brydson, R., Harrington, J. P., Markowitz, K. & Milne, S. J. (2009) Characterization of dentine structure in three dimensions using FIB-SEM. *European Focused Ion Beam Users Group Conference*, 5th October, Palais des Congrès, Arcachon, France.

Leary, R. K., Walshaw, R. D., & Brydson, R. (2009) Characterisation of ESEM conditions for specimen hydration control, *Electron Microscopy and Analysis Group Conference*, 8-11th September, University of Sheffield, UK.

Leary, R. K., Merson, E., Birmingham, K., Harvey, D. & Brydson, R. (2009) Microtextures and grain boundary misorientation distributions in controlled heat input titanium alloy fusion welds, *Electron Microscopy and Analysis Group Conference*, 8-11th September, University of Sheffield, UK.

Leary, R. K., Merson, E., Birmingham, K., Harvey, D. & Brydson, R. (2009) Microtextures and grain boundary misorientation distributions in controlled heat input titanium alloy fusion welds, *European Titanium Conference*, 23-24th June, The Belfry, Birmingham, UK.

Leary, R. K., Merson, E., Birmingham, K., Harvey, D. & Brydson, R. (2009) Microtextures and grain boundary misorientation distributions in controlled heat input titanium alloy fusion welds, *Royal Microscopical Society Electron Backscatter Diffraction Meeting*, 30-31st March, University of Swansea, UK.