Yukie Tanino

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Education

Massachusetts Institute of Technology Cambridge, MA

09/2008 Ph.D. in Environmental Fluid Mechanics, Department of Civil and Environmental Engineering. Cumulative Graduate GPA: 4.9 / 5.0

09/2004 S.M. in Civil and Environmental Engineering, Department of Civil and Environmental Engineering.

06/2003 B.S. in Environmental Engineering Science, Department of Civil and Environmental Engineering. Cumulative Undergraduate GPA: 5.0 / 5.0

Professional Experience

08/2018 – present **Senior Lecturer**
School of Engineering, University of Aberdeen Scotland, UK

Admin. Chair, School of Engineering Health & Safety Committee (11/2016-). School of Engineering representative, University Research Facilities Working Group (09/2022-). Member, School of Engineering Research Committee (11/2022-). Manager, Subsurface Flow and Transport Research Laboratory (01/2015-). Senate representative, University Sustainable Development Committee (09/2020 – 09/2022). Elected Member of the Senatus Academicus (10/2018 – 09/2022).

Research. Carry out independent research in the area of multiphase porous media flows with focus on application to microplastics-contaminated soil, groundwater remediation, and hydrocarbon recovery. (Co-)supervise postgraduate research students and research staff.

Teaching & learning support. I currently teach *Fluid Mechanics* (all undergraduate 3rd year students except Electrical and Electronics) and *Enhanced Oil Recovery* (MSc and MEng Petroleum Engineering) and supervise UG and MSc dissertations. Internal and external examiner of PhD students at UK and overseas institutions.

06/2018 – 06/2021 **Adjunct (honorary) Senior Lecturer**
School of Engineering, Edith Cowan University West Australia

09/2012 – 07/2018 **Lecturer**
School of Engineering, University of Aberdeen Scotland, UK

11/2009 – 09/2012 **Research associate**
Qatar Carbonates and Carbon Storage Research Centre (QCCSRC)
Imperial College London London, UK
PI: Martin J Blunt

10/2008 – 10/2009 **Postdoctoral researcher**
Laboratoire Fluides, Automatique et Systèmes Thermiques Orsay, France
Jean-Pierre Hulin (PI) & Frédéric Moisy

Turbulence in stratified shear flows in an inclined tube. Supported by Agence Nationale pour la Recherche grant ANR-07-BLAN-0181.

Graduate research assistant
MIT
PI: Heidi M. Nepf

09/2004 – 08/2008 Turbulence and lateral dispersion of passive solute in arrays of randomly-distributed cylinders. Supported by US National Science Foundation (NSF) grants EAR-0509658, EAR-6895392, and EAR-0309188.

06/2003 – 09/2004 Lock-exchange flows through random cylinder arrays. Supported by NSF grant EAR-0309188.

External Memberships and Affiliations

- Member, UK Royal Society International Exchanges Committee. 1 Jan 2024 – 31 Dec 2026.
- Associate Editor, *Water Resources Research*. 06 Sept 2022 – 31 Dec 2025.
- Member, Local Organizing Committee, 10th International Symposium on Environmental Hydraulics, June 2024.
- Topic Editor, Enabling Energy Transition: CO_2 Geological Storage and Large-Scale Hydrogen Underground Storage, *Frontiers in Energy Research.* July 2021 – Aug 2022.
- Lifetime Member, Society of Core Analysts.
- Chapter Affiliate, Society of Petrophysicists and Well Log Analysts (SPWLA).
- Tau Beta Pi Scholar, 2002-03. US national engineering honours society.
- Member, Scottish Carbon Capture & Storage (SCCS).

External Examination

2024 PhD, Department of Civil Engineering, McMaster University, Canada
2024 PhD, School of Engineering & Physical Sciences, Heriot-Watt University, UK
2023 PhD, University of New South Wales, Australia
2023 PhD, Imperial College London, UK
2021 PhD, Robert Gordon University, UK
2020 PhD, University of Bergen, Norway
2020 PhD, Curtin University, Australia
2019 PhD, School of Engineering & Physical Sciences, Heriot-Watt University, UK

External Grants & Funding

11/2024 – 11/2027 *Unravelling the formation and impact of the plastisphere in response to environmental stresses in microplastic contaminated soils*. UK Natural Environment Research Council (NERC; full economic cost value £622.9k), Co-Lead.

10/2024 - 09/2027 *Impact of grain roughness on gas-water-oil flow in hydrophilic porous media*. The Higher Committee for Education Development in Iraq. PhD studentship for A Habeeb (£90650 excl. monthly stipend paid to student), PI.

10/2022 - 01/2023 *Corefloods to test reservoir barrier technology*. Aubin Group (£10383), PI.

01/2022 - 03/2022 *Complex DNA-based tracers to investigate the transport of microbes in soil*. UK Biotechnology and Biological Sciences Research Council (BBSRC) Mitigation Fund (£49.8k), Co-I.

05/2021 – 04/2023 *TRAMPAS*. European Commission. Individual Fellowship for Nasrollah Sepehrnia (€224.9k), named co-supervisor.

09/2020 – 08/2023 *Integrate digital rock physics and big data with AI to optimize oil recovery*. China National Offshore Oil Corporation (£160k), Co-I.

03/2019 – 03/2021 *Non-planar propagation of hydraulic fracture in transition zone of coal measure strata*. Royal Society International Exchanges Cost Share 2018 China (£11.1k), Co-I.

08/2015 – 08/2020 *Engineered inversions in reservoir wettability and its impact on oil recovery from fractured reservoirs*. COREX (UK) Ltd. PhD studentship (£41.4k), PI.

07/2016 – 09/2019 *Oil recovery from fractured reservoirs*. Mexican National Council for Science and Technology (CONACyT). PhD studentship for Xanat Zacarias Hernandez (£64.1k).

05/2016 – 04/2018 *Dynamic, in-situ imaging of capillary imbibition in rock using simultaneous neutron and X-ray computed tomography*. Engineering and Physical Sciences Research Council EP/N021665/1 (£20.6k), PI.

12/2016 – 09/2017 *Modelling the deep biosphere over deep geological time at the Nankai Trough, Japan*. NERC NE/P015182/1 (£35.4k), Co-I.

10/2014 - 03/2016 *Dynamic pore-scale imaging of capillary imbibition in mixed-wet porous media using lab-on-a-chip methods*. Royal Society Research Grant RG140009 (£15k), PI.

07/2014 – 08/2015 *Neutron tomography: a novel approach for investigating the dynamics of oil recovery by capillary imbibition*. Carnegie Trust for the Universities of Scotland Research Grant ref. 31813 (£2.5k), PI.

Internal Grants & Funding

08/2022 – 09/2022 *On the factors that determine plastic transport in rivers*. EU Brexit Mitigation Fund (£3263). University of Aberdeen. Co-I.

10/2015 – 09/2018 *Pore-scale imaging of two-phase flow: Linking in-situ contact angles to bulk properties*. 36-month PhD scholarship (est. £48.6k). School of Engineering, University of Aberdeen. Co-I.

10/2015 – 09/2018 *Impact of wettability on two-phase flow in geological porous media: linking macroscopic properties to pore-scale fluid distribution*. 36-month PhD scholarship (est. £48.6k). School of Geosciences, University of Aberdeen. PI.

09/2015 – 08/2016 *Fate and transport of particulate organic matter during waterflood*. 36-month PhD scholarship (est. £48.6k). School of Geosciences, University of Aberdeen. Co-I.

2013 – 2016 *Impact of wettability on two-phase flow phenomena relevant to enhanced oil recovery and geological CO_2 storage*. 36-month PhD studentship (est. £52k). College of Physical Sciences, University of Aberdeen. PI.

Awards & Honours

2006 – 2007 MIT Martin Family Society of Fellows for Sustainability (US$26844.50)

2003 – 2004 MIT Presidential Graduate Fellowship (US$48660)

2003 The Richard Lee Russel Award
(departmental award for outstanding undergraduate academic achievement)

2002 – 2003 Tau Beta Pi Scholarship (one of 39 awarded by the national engineering honour society for outstanding scholarship, US$2000)

Other Qualifications

07/2021 National Examination Board in Occupational Safety and Health (NEBOSH) *HSE Introduction to Incident Investigation* Award

Postgraduate Research Students Supervised to Completion

2023 Kazeem A Odunlami. *Impact of Grain Roughness on Liquid Permeability of Packed Columns of Glass Spheres*, MSc by Research in Engineering. Conferred 24 Oct.

2020 Girvani Manoharan. *Characterisation of Propagation of Fractures in Rocks using X-ray and Neutron Imaging*, PhD in Engineering. Conferred 25 Aug.

2020 Iton Whiteley Iton. *Adsorption process of Carbon Dioxide and Nitrogen Gas in Shale*, MSc by Research in Engineering. Conferred 30 June.

2020 Anelechi Ibekwe. *Impact of Grain Roughness on Porous Media Flow: a Pore-Scale Investigation*, PhD in Engineering. Conferred 19 Mar.

2020 Olalekan O. Ajayi. *Impact of Grain Roughness and Oil Viscosity on Porous Media Flow: a Microfluidic Study*, MSc by Research with Distinction. Conferred 20 Feb.

2018 Magali Christensen. *Impact of Wettability on Two-Phase Flow in Oil/Water/Carbonate Rock Systems*, PhD in Engineering. Conferred 30 Oct.

2018 Dhelda R Mfanga. *Impact of Drilling Fluids on the Geomechanical Stability of Wellbores*, PhD in Petroleum Engineering. Conferred 15 Oct.

Invited Seminars, Lectures, and Panels

09/2024 Korean Institute of Construction Technology, Korea.

09/2024 Department of Civil and Environmental Engineering, Seoul National University.

09/2024 Department of Civil and Environmental Engineering, Yonsei University, Seoul.

03/2024 University of Strathclyde and Japan Society for the Promotion of Science (JSPS) London, invited panel speaker

08/2022 University of Birmingham.

04/2022 Institute for Multiscale Thermofluids, University of Edinburgh.

03/2022 Society of Petroleum Engineers Student Chapter, University of Aberdeen.

10/2021 Department of Civil and Environmental Engineering, Seoul National University.

10/2019 College of Petroleum Engineering, China University of Petroleum - Beijing.

02/2019 Research Centre for Carbon Solutions (RCCS), Heriot Watt University, Edinburgh.

07/2014 Neutron Physics Group, National Institute of Standards and Technology, Gaithersburg MD, USA.

03/2014 The Petroleum Institute, Abu Dhabi.

01/2013 Porous Media-Processes and Mathematics Research Network kick-off meeting, International Centre for Mathematical Sciences, Edinburgh.

01/2013 Department of Petroleum Engineering, University of Stavanger.

04/2012 Division of Civil Engineering, University of Dundee.

10/2010 Petroleum and Process Technology Research Group, Department of Physics and Technology, University of Bergen.

06/2010 School of Engineering, University of Warwick.

02/2010 Hydrodynamics Laboratory, Ecole Polytechnique, France.

01/2008 Department of Civil & Environmental Engineering, Cornell University, USA.

Selected Publications

Invited book chapters

2023 **Y. Tanino**, D. Pokrajac. Immiscible Fluids. In: *Encyclopedia of Soils in the Environment*, 2nd ed. Section Eds: P. Hallett, D. Or. Elsevier.

2012 **Y. Tanino**. Flow and mass transport in vegetated surface waters. In: *Fluid Mechanics of Environmental Interfaces*. Eds: C. Gualtieri, D. T. Mihailovic. Taylor & Francis.

2012 **Y. Tanino**. Water exchange between littoral zone and open lake water. In: *Encyclopedia of Lakes and Reservoirs*. Eds: L. Bengtsson, R. W. Herschy, R. W. Fairbridge. Springer.

Peer-reviewed journals (* denotes corresponding author; + denotes joint first author)

2024 M. Sarlak*, A. J. McCue, **Y. Tanino***. Data from laboratory measurements of interfacial tension, viscosity, and density of two naphthenic acids in n-hexadecane at varying temperature and concentrations. *Data in Brief*, under review.

2024 M. Sarlak*, J. Reed, S. Law, A. J. McCue, **Y. Tanino**. Water and oil volume measurement using UV-visible spectroscopy. *Transport in Porous Media*, doi: 10.1007/s11242-024-02140-6.

2024 F. Zhao*, **Y. Tanino**, J. Guo, R. He, J. Ren, J. Zeng, W Chen, L. Huang. Bed strength in sheared beds of mono- and bi-disperse particles: dependence on geometrical and mechanical properties of constituent particles. *Powder Technology*, doi: 10.1016/j.powtec.2024.120286.

2024 N. Sepehrnia*, C. Gubry-Rangin, **Y. Tanino**, P. D. Hallett. Microplastics alter soil structural stability as quantified by high-energy moisture characteristics. *Journal of Hazardous Materials*, doi: 10.1016/j.jhazmat.2024.134940.

2024 M. Sarlak*, K. Jarrahian, A. J. McCue, J. A. Anderson, **Y. Tanino**. Adsorption of organic acids in oil on crushed marble at varying temperatures and ambient pressure. *Colloids & Surfaces A*, doi: 10.1016/j.colsurfa.2024.133231.

2021 A. Syed, **Y. Tanino**, J. M. LaManna, D. L. Jacobson, D. S. Hussey, E. Baltic, G. Burca. A portable triaxial cell for beamline imaging of rocks under triaxial state of stress. *Measurement Science & Technology*, doi: 10.1088/1361-6501/abeb94.

2020 **Y. Tanino***, A. Ibekwe, D. Pokrajac. Impact of grain roughness on residual non-wetting phase cluster size distribution in packed columns of uniform spheres. *Physical Review E*, doi: 10.1103/PhysRevE.102.013109.

2020 A. Ibekwe, D. Pokrajac*, **Y. Tanino**. Automated extraction of in situ contact angles from micro-computed tomography images of porous media. *Computers & Geosciences*, doi: 10.1016/j.cageo.2020.104425.

2019 A. Ibekwe, **Y. Tanino***, D. Pokrajac. Non-hazardous protocol for surface texturing of glass particles. *Tribology Letters*, doi: 10.1007/s11249-019-1230-3.

2019 **Y. Tanino***, A. Syed. Enhanced oil recovery by polymer flooding: direct, low-cost visualization of in a Hele-Shaw cells. *Education Sciences*, doi: 10.3390/educsci9030186

2019 X. Zacarias-Hernandez, M. Christensen, **Y. Tanino***, O. O. Ajayi. Laboratory measurements of viscosity, density, and bulk contact angle on marble and soda lime glass for three naphthenic acid + *n*-decane solutions. *Data in Brief*, doi: 10.1016/j.dib.2019.103988.

2019 **Y. Tanino***, M. Christensen. Imbibition capillary pressure and relative permeability of mixed-wet limestone and their dependence on contact angle. *Transport in Porous Media*, doi: 10.1007/s11242-019-01280-4.

2018 **Y. Tanino***, X. Zacarias-Hernandez, M. Christensen. Oil/water displacement in microfluidic packed beds under weakly water-wetting conditions: competition between precursor film flow and piston-like displacement. *Experiments in Fluids* 59(2): 35.

2017 M. Christensen, **Y. Tanino***. Enhanced permeability due to apparent oil/brine slippage in limestone and its dependence on wettability. *Geophysical Research Letters* 44: 6116-6123.

2017 M. Christensen, **Y. Tanino***. Waterflood oil recovery from mixed-wet limestone: dependence upon the contact angle. *Energy & Fuels* 31(2): 1529-1535.

2016 S. A. Bowden, **Y. Tanino***[+], B. Akamairo, M. Christensen. Recreating mineralogical petrographic heterogeneity within microfluidic chips: assembly, examples, and applications. *Lab-on-a-Chip* 16: 4677-4681.

2015 **Y. Tanino***, F. Moisy, J.-P. Hulin. Lock-exchange flows in inclined pipes: the relevance of the Prandtl mixing length model. *Journal of Turbulence* 16(5): 484-502.

2013 **Y. Tanino***, M. J. Blunt. Laboratory investigation of capillary trapping under mixed-wet conditions. *Water Resources Research* 49(7), doi: 10.1002/wrcr.20344.

2012 **Y. Tanino***, M. J. Blunt. Capillary trapping in sandstones and carbonates: dependence on pore structure. *Water Resources Research* 48 W08525.

2012 **Y. Tanino***, F. Moisy, J.-P. Hulin. Laminar-turbulent cycles in inclined lock-exchange flows. *Physical Review E* 85(6), doi: 10.1103/PhysRevE.85.066308.

2009 **Y. Tanino***, H. M. Nepf. Closure to "Laboratory investigation of mean drag in a random array of rigid, emergent cylinders." *Journal of Hydraulic Engineering* 135(8).

2009 **Y. Tanino***, H. M. Nepf. Laboratory investigation of lateral dispersion within dense arrays of randomly distributed cylinders at transitional Reynolds number. *Physics of Fluids* 21(4).

2008 **Y. Tanino***, H. M. Nepf. Lateral dispersion in random cylinder arrays at high Reynolds number. *Journal of Fluid Mechanics* 600.

2008 **Y. Tanino***, H. M. Nepf. Laboratory investigation of mean drag in a random array of rigid, emergent cylinders. *Journal of Hydraulic Engineering* 134(1).

2005 **Y. Tanino***, H. M. Nepf, P. S. Kulis. Gravity currents in aquatic canopies. *Water Resources Research* 41(12) W12402.

11 December 2024