

CURRICULUM VITAE

Hai Minh DUONG, Associate Professor with Tenure

Department of Mechanical Engineering, National University of Singapore, SINGAPORE

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1. Education history

Degree	University	Period
B.Eng.	Chemical Engineering Department, Ho Chi Minh City University of Technology, Vietnam	Sep 92 – Jul 97
PhD	Biochemical and Chemical Engineering Department, University of Melbourne, Australia	Nov 99 – Jun 04

2. Professional membership and grade

Year	Position	Organization
2014	Editorial Member	International Journal of Aeronautical Science and Aerospace Research (IJASAR)
2014	Key member	Functional Material Society in Singapore

3. Employment history

Period	Position	Institution
Jan 04 – Nov 05	Postdoctoral Fellow	School of Chemical Engineering and Materials Science, University of Oklahoma, USA
Nov 05 – Nov 07	Postdoctoral Fellow	Department of Mechanical Engineering, University of Tokyo, Japan
Jan 08 – Dec 09	Postdoctoral Associate	Department of Aeronautics and Astronautics, Massachusetts Institute of Technology, USA
Jan 10 – Oct 10	Research Fellow	Department of Materials Science and Metallurgy, University of Cambridge, UK
Oct 10 – Jul 17	Assistant Professor	Department of Mechanical Engineering, National University of Singapore (NUS), Singapore
Jul 17 - now	Associate Professor with Tenure	Department of Mechanical Engineering, National University of Singapore (NUS), Singapore

4. Research

4.1. My research areas and interests

- I have sustained national and international acclaim for my achievements as a leader in my field. The total amount of 9 research grants from different funding sources is over S\$6M. I have attracted visibility to my research through scholarship, awards, publications and invitations to international meetings. I am the Primary Investigator of two light-weight material labs at NUS (www.cnt-nus.com), where I conduct research in carbon-based nanoengineering materials, including CNTs, graphene, natural fibers and aerogels. Their applications are for aerospace structures, energy devices, environmental treatment, medical devices, manufacturing process simulations and thermal transport phenomena in small-scale and/or biological systems. My research impact has been highlighted as below.

From Google scholar*	
Citations	1444
H index	22
i10 index	36

*https://scholar.google.com.sg/citations?user=_Uzn3cgAAAAJ&hl=en accessed 5 Dec 2017

- Waste paper, which is of little use to most, has been given a new lease of life. As a “super material” that can absorb oils up to four times its weight, making it useful in disasters like oil spills. Also, its

fabrication process uses 70 per cent less energy, is faster and cheaper, and produces less harmful dioxins and air pollutants, while 99 per cent of the oil absorbed can be recovered. At the end of its useful life, they can be safely ground into fine particles and scattered on the ground to accelerate the natural biodegradation process. I also noted that cellulose is low cost and makes up 75 to 85 per cent of recycled paper. The technology was licensed by the NUS Industry Liaison Office to a company called Bronxculture in November last year, with manufacturing facilities located in Singapore. The cellulose aerogel can be used to make products such as thermal insulating materials for buildings, packaging, and winter jackets, as well as reusable oil absorption products. Other potential applications include first-aid plugs for wounds, make-up removers, and diapers. Noting the burden of paper-related waste on the environment, I hopes to turn recycled waste into even more useful products, and contribute towards environmental conservation. I have won the global innovation awards of my recyclable cellulose aerogel invention: (i) TechConnect Global Innovation Award 2016 in USA; and (ii) IET Innovation Award 2016 in UK.

- Aerogel technique to mass-produce carbon nanotube fibres also wins JEC Asia 2016 Awards. I am one of the pioneers using the aerogel technique - also called the floating catalyst method - to mass-produce carbon nanotube (CNT) fibres and aligned CNT thin films having well-controlled morphology through through a continuous-draw process from a CNT aerogel and then the post treatment methods. The novel aerogel technique for mass-producing CNT fibres won the JEC Asia 2016 Awards, for its ability to overcome the limitations of the common spinning and wetting techniques used to manufacture CNT fibres. This process is simple and cost-effective. It also allows mass production of high quality CNT fibres; the CNT fibres are collected simultaneously onto the spindle at the rate of 2 kilometres per hour. The CNT fibres produced are condensed and durable, with tensile strength and stiffness higher than the commercialised CNT fibres spun from wet spinning and array spinning methods. As CNT fibres have excellent properties, they may be used to replace other materials in a wide variety of applications related to consumer goods, electrical and electronics, energy, healthcare, automobile, aerospace, and defence sectors. With the growing demand for CNT fibres, many CNT vendors are investing heavily in new production facilities.
- For the energy storage and catalyst research, I have published two book chapters of “Advanced Supercapacitors Using Carbon Nanotubes” in Springer in 2016 and “Carbon Nanotube - Nickel Hydroxide Composites for Supercapacitors” in Wiley in 2017. Among 12 journal papers of my supercapacitor and catalyst research, my 2012 Journal of Physical Chemistry C paper, "Electrospun TiO₂ graphene composite nanofibers as a highly durable insertion anode for lithium ion batteries," has been independently cited 132 times, placing it in the top 1% for the field and publication year.

4.2. Summary of significant contributions and awards:

4.2.1. Research grants:

My research is sustainable. The total amount of 9 research grants from 7 different funding agencies is over S\$6M. I have attracted visibility to my research through scholarship, awards, publications and invitations to international meetings.

Time	Source	Amount, S\$	Project title	Role
2010 - 2013	MOE Tier 1 (Start-up grant)	\$180,000	Physics, Nanostructured Transport and Engineering Applications of Carbon-based Nanomaterials	PI
2012- 2015	SERC 2011 Public Sector Research Funding (PSF) Grant	\$630,396	Advanced Energy Devices Using Carbon Nanotube Aerogels	PI
2014 - 2016	Defence Research and Technology Office via Temasek Laboratories @ NUS	\$1,025,000	Carbon Nanotube Fibers	PI
2014 - 2015	NRF POC 11th Grant	\$230,000	Super Heat Insulation, Ultra Lightweight, Hydrophobic Aerogels from Environmental Wastes for Tropical Climate	PI

			Usage	
2012 - 2015	Environment Technology Research Program (7th RFP)	\$281,700	Biodegradable, Flexible, and Ultrastrong Cellulose Aerogels from Paper Waste for Replacing Bubble Wrap and Cleaning Oil Spills	PI
2015 - 2018	Office of DPRT	\$3,000,000	Mechanical Engineering Centre for Composites Engineering and Research	Co-PI
2015 - 2018	Minister of Education (MOE) Tier 2	\$676,412	Integrated Phototherapy Device for Combined Photodynamic & Photothermal Therapy	Co-PI
2016 - 2017	FB Research support	\$70,000	Cotton Aerogel from Fabric waste	Co-PI

4.2.2. Scholarships and International Awards:

- TechConnect Global Innovation Award 2016 in USA for the invention: "Recyclable Cellulose Aerogels".
- JEC Asia 2016 Innovation Award 2016 in Singapore for the invention: "Advanced Carbon Nanotube Fiber Composites from Aerogel Techniques".
- IET Innovation Awards 2016 in UK for the invention: "Biodegradable cellulose aerogels from sol gel technique using paper wastes". The winner will be announced in Nov 2016.
- CamBridgeSens Innovation and Network grant award, University of Cambridge, UK in 2010.

4.2.3. Publications: More details can be found on my personal website www.cnt-nus.com.

Publications	Total Publications
Published international Journals	66
International conference papers	103
Keynotes and invited talks at international and regional conferences	33
Invited book chapters	10
Commercialized patents excluding national-level patents in China, Thailand, Vietnam....	3
TOTAL	215

4.2.3. Published material about my research has appeared in major media

- My research at the National University of Singapore (NUS) has received media coverage from the country's most widely read news media. The Straits Times, Singapore's #1 newspaper with 1.4 million readers, published two separate articles discussing my work. One, "From paper waste to powerful absorbent," protruded me as the leader of the team at NUS that developed a new material for oil-spill cleanups. "Assistant Professor Duong Hai Minh from the NUS department of mechanical engineering, who led the development of the material, said absorbent materials made of polypropylene - a synthetic sorbent now commonly used to clean up oil spills. But their absorption capabilities are low and slow, and they are also non-biodegradable. The material his team has developed, however, is created from cellulose fibers found in waste paper, which make it biodegradable and non-toxic " - Samantha Bob, The Straits Times, February 12, 2016. The second Straits Times article discussed my work as a solution to oil spills, of which it reported more than 1,600 on Singapore roads in 2015. The paper highlighted my aerogel in an info-graphic about how oil spills are cleared, and quoted Dr. Duong in the body of the article. My work also reached 529,000 readers through Singapore's #2 newspaper, TODAY. Together, the readership of the two publications reporting on my work and myself totaled more than 2.0 million people.
- Several USA newspapers and Xinhua news in China in October 2017 also highlighted Researchers at Rice and my laboratory of National University of Singapore (NUS) have developed a simple oxidative method to clean the fibers and make them usable for a broader range of applications. Pasquali noted the collaboration between Rice and Singapore represents convergence of another

kind. "This may well be the first time someone from the Cambridge fiber spinning line (Duong was a postdoctoral researcher in Windle's lab) and the Rice fiber spinning line have converged," he said. "We're working together to try out materials made in the Cambridge process and adapting them to the Rice process." "The floating catalyst method can produce various types of nanotubes with good morphology control fairly quickly. The nanotube filaments can be collected directly from their aerogel formed in the reactor. These nanotube filaments can then be purified and twisted into fibers using the wetting technique developed by the Pasquali group." said co-author Hai Minh Duong, an NUS assistant professor of mechanical engineering.

4.2.5. Grant and journal referees: I have been invited and have served as a reviewer of over 350 manuscripts of 84 preferred journals having high impact factors. Top 10 journals with the highest impact factor which I have been as the reviewer are:

No.	Journal title	5 year IF#
1	Advanced Materials	18.17
2	ACS Nano	13.77
3	Nano Energy	12.27
4	Chemistry of Materials	9.41
5	Journal of Chemistry of Materials	8.42
6	Nanoscale	7.76
7	Journal of Materials Chemistry A	6.74
8	Carbon	6.64
9	ACS Applied Materials & Interfaces	5.91
10	Applied Energy	5.60

Based on journal citation report 2016 on Web of Science (WoS)

4.2.6. International conference committees: I have served as the conference committee, the session chair and the guest honor of 10 international conference in USA, Australia, India, Vietnam and Singapore.

Year	Position	Conference
2012	Conference committee	International Conference of Young Researchers on Advanced Materials (ICYRAM), July 1-6, 2012, Singapore.
2015	Conference committee	South East Asia - Japan Conference on Composite Materials (SEA-JCCM), September 21-23, 2015, Singapore
2015	Session chair	APCChE 2015 Congress incorporating Chemeca 2015, September 27 - October 1, Melbourne, Australia
2016	Conference committee	5 th Annual International Conference on Sustainable Energy and Environmental Sciences (SEES 2016) February 22-23, 2016, Singapore.
2016	Conference committee	2016 International Conference on Innovative Engineer Materials (ICIEM 2016), August 20-22, 2016, Singapore.
2016	Session chair	International Conference on Recent Innovation in Engineering and Technology (ICRIET 2016), 5-6 Nov 2016, Gunupur, India.
2017	Guest Honor and Session chair	International Conference on Contemporary Issues in Science, Engineering and Management (ICCI-SEM-2K17), 18-19 Feb 2017, Bhubaneswar, India.
2017	Session chair	2017 MRS Spring Meeting and Exhibit, 17-21 April 2017, Arizona, USA.
2017	Conference committee	International Conference on Innovative Research in Science, Technology and Management (ICIRSTM-17), 16-17 September 2016, Singapore.
2017	Session chair	3rd International Conference on Chemical Engineering, Food and Bio Technology (ICCFB2017), October 12 - 13, 2017, Ho Chi Minh City, Vietnam

5. Teaching :

- Two graduated PhD students under my main supervision won Young Tribologist award 2014 in Malaysia and the student travel grant of 8th EMN Fall Meeting 2014 in Florida, USA.
- One conference paper of the 7th International Conference on Teaching and Learning in Higher Education (TLHE) 2014 in Singapore.
- Current main research supervision and mentor: 2 postdoctoral associates and 1 PhD student as the main and sole supervisors, 1 research engineer, 5 final year project (FYP) students, over 40 undergraduate students per year. My laboratory alumni members are 7 postdoctoral associates, 6 graduated PhD students, 1 visiting lecturer, 2 research engineers, 33 final-year-project (FYP) undergraduate students, 2 special project students, 1 internship student.

Summary of my teaching contributions

Module code	Shared or full load (indicate %)	Module Title	Comments
ME4255	50% (Lec and Tut)	Failure of Materials	My current elective module for undergraduate students.
ME3211	50% (Lec and Tut)	Mechanics of Solids	My current elective module for undergraduate students.
ME4254	50% (Lec and Tut)	Materials in Engineering Design	My past elective module for undergraduate students.
ME3251	50% (Lec and Tut)	Materials for Engineers	My past elective module for undergraduate students.
ME3101, 3102 and 3103	100% (Tut)	Mechanical Systems Design	My current elective modules for undergraduate students.
ME6503	33.3% (Lec and Tut)	Theory of Transformations in Metals	My elective module for graduate students.

The teaching evaluation for all modules is subsequently more positive; teaching scores have also improved and were higher than the department scores. Providing module-related commitments and clarifications on the first day of the class and discussion platforms on IVLE are very helpful. It is also important to note the markedly different learning approaches and expectations of various students. The qualitative student feedback is also much more positive, with student providing comments such as 'Good teaching style makes class filled with fun of learning'; 'Teacher is very approachable for consultation and problems'; 'Teacher interact with each of us and to urge us to finish and learn the tutorial'; and 'Cheerful, approachable and responsible lecturer who concerned about student progress'.

I have always enjoyed the role of advisor and teacher of undergraduate and graduate students in the past and look forward to continuing working with colleagues and students. Six of my graduated PhD students have been working as the assistant professors in China and postdoctoral associates at world-class laboratories around the world. There have been 38 undergraduate students who have done the 9-month research projects under my main supervision. Their final year projects (FYPs) have been published as 3 commercialized patents, over 9 published journal papers and 7 conference proceedings at international and regional conferences. Though my teaching evaluation scores of all my modules have been much higher than the average scores of the mechanical engineering Department and Engineering Faculty at NUS, I believe there is plenty of room for my teaching improvement for the students' benefits.

6. Service: I have contributed to numerous services on the departmental, faculty, national and international levels.

- Since 2015 I have been the deputy lab supervisor of materials science group and the space committee of my ME department. In that capability, I can: (i) approve chemical and equipment purchase and attend lab budget meetings, (ii) host lab visitors and (iii) ensure the labs are safe and health-risk free for students and visitors. I have mentored my graduate students and over 40 undergraduate students of my department each year. Students are welcomed to see me for advice and help concerning specific modules.

- On the Faculty/University level, I have hosted several overseas academic visitors interested in the research collaboration with NUS. I also collaborated with other professors of various departments such as Department of Materials Science and Engineering on Energy device development using carbon-base aerogels supported by SERC 2011 public sector research funding; and Department of Biomedical Engineering on Integrated phototherapy device for combined photodynamic and photothermal therapy supported by the MOE tier 2 funding.
- On the National level, I have worked effectively with several Singapore government agencies such as MINDEF Singapore (<https://www.mindef.gov.sg/>) for thermal jacket development of soldier water canteens and super-strong CNT fibers for defense applications. Land Transport Authority (LTA, <https://www.lta.gov.sg/content/ltaweb/en.html>), Maritime and Port Authority of Singapore (MPA, <http://www.mpa.gov.sg/web/portal/home>) and myself have developed the cost-effective method to clean oil spill accidents on the road and in the sea. The method was highlighted in the national newspaper, Strait Times.
- On the International level, I have contributed as a reviewer of over 350 manuscripts of 86 journals with high impact factors in my research directions such as Advanced Materials, ACS Nano, Nano Energy and Journal of Materials Chemistry A. I have been the key member of the scientific journal IJASAR and the Functional Material Society in Singapore. I was the conference committee and session chair at top international conferences shown in section 4.2.6 and delivered over 30 invited talks and keynotes in USA, Europe and Asia. I have also been invited as the PhD thesis examiner of the overseas Universities in Australia, India and Spain such as University of Melbourne, Australia.

Referees: Please note recommendation letters will be submitted once requested.

- **Professor Nhan Phan-Thien**
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