

## CURRICULUM VITAE



**1. Name:** Hai Minh DUONG  
**2. Department:** Mechanical Engineering  
**3. Current Appointment:** Assistant Professor

### 4. 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

### 5. Name of PhD supervisor:

Full Professor David Shallcross, University of Melbourne, Australia

### 6. Professional membership and grade:

Year	Position	Company/Institution
2014	Editorial Member	International Journal of Aeronautical Science and Aerospace Research (IJASAR)
2014	Key member	Functional Materials Society in Singapore

### 7. 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 – To date	Assistant Professor	Department of Mechanical Engineering, National University of Singapore (NUS), Singapore

### 8. Teaching:

#### 8.1. Modules taught and student evaluations

Module code	Module Title
ME3211	Mechanics of Solids
ME4254	Materials in Engineering Design
ME3251	Materials for Engineers
ME3101 and ME3102	Mechanical Systems Design I and II
ME6503	Theory of Transformations in Metals

#### 8.2. Number of Graduate Students Supervised

No. of students	Graduated			Total	Current			Total
	Sole supervisor	Main supervisor	Co-supervisor		Sole supervisor	Main supervisor	Co-supervisor	
PhD	0	3 <sup>a</sup>	0	3	1	3 <sup>b</sup>	0	4
MEng	0	1	0	1	0	0	0	0

<sup>a</sup> After graduation, they have been working as research fellows in USA, Japan and Singapore.

<sup>b</sup> One PhD student will submit the thesis by 8 Jan 2016.

### 8.3. List of Contributions to Teaching Materials

- a. Contribution to undergraduate elective modules of ME3211, ME3251 and ME4254:
  - Revamping syllabus of modules ME3211 and ME3211E - Mechanics of solids by cutting down elasticity content and adding more content on failure of composites and composite applications. The quiz was also terminated and replaced by a group project with given composite topics to enable students to learn from each other and be able to summarize other composite applications and their advanced multi-properties.
  - Several Youtube clips were added into all modules such as ME3211, ME4254 and ME3251 to demonstrate industrial applications of module theories and materials taught in the modules. The Youtube clips were very useful to show experiments in laboratories to determine important parameters of equations and matrices in the theory of the modules.
- b. Contribution to the graduate elective module of ME6503: In 2011, I revamped a third of the syllabus of this module by replacing the earlier metal composite contents with science and applications of carbon-based nanomaterials. I believe my contents have made the module more cohesive as students learnt, in the first two-thirds of the course, mostly about how carbon content could enhance mechanical properties of steels and cast irons through their phase change diagrams.

**8.4. List of Other contributions to Teaching:** 1 oral presentation at 7<sup>th</sup> International Conference on Teaching and Learning in Higher Education (TLHE), 2014, Singapore.

### 9. Research:

#### 9.1. Research areas/ interests:

Carbon nanotube (CNT) and aerogel materials are my core research interests. The significance of my CNT work, which I have gained recognition from my peers, is to investigate the heat transport phenomena and limitations of the CNT composites through experiments and multi-scale modeling using the random walk algorithm. The developed technique can handle composites with several CNTs, speed up the calculation of CNT thermal interactions significantly and observe the most important parameters prior to manufacturing the actual materials. At NUS, this algorithm has been extended to investigate the thermal conductivities of three-phase composites by taking into account the thermal boundary resistances between CNTs, inorganic nanoparticles and polymer matrices for the first time. The thermal boundary resistances at the interfaces can dominate and limit the heat transportation of the multi-phase CNT composites. The developed modeling can predict more accurate thermal conductivities of the complex CNT composites than molecular dynamics simulation and finite element methods. The effects of orientations, concentrations, interface contacts of CNTs and nanoparticles in the composites have been quantified. Since experimentalists cannot measure thermal boundary resistances among CNTs, inorganic nanoparticles and polymer matrices my random walk method can track down these values for multi-phase systems like graphene aerogel- polymer composites and CNT-epoxy composites. I have also solved nanoparticles agglomeration problems in polymer composites by converting the nanoparticles into their aerogel form and then backfilling polymers into their aerogel pores.

For the aerogel research, I have successfully developed cost-effective methods making very light aerogels with large surface areas for energy devices and environmental applications. For example, the technique of a polysaccharide aerogel from paper waste was successfully invented and granted a patent, WO 2014/178797 A1. The developed cellulose aerogels from paper waste are highly porous, ultra-light-weight, flexible, water repellent, oleophilic and have high absorption capacity and extremely low thermal conductivity. Several companies have been interested in this technology and are looking forward to commercializing the cellulose aerogel products as eco-friendly sorbents with high absorption for cleaning oil spills and water repellent, as well as ecofriendly heat insulators for buildings. My invention can help solving the environmental problems of Singapore as Singapore produces one million tons of various types of paper waste per year. Combining both CNT and aerogel studies, my laboratory has been produced km-long CNT fibers, aligned CNT thin films and flexible CNT aerogels using the CNT aerogel techniques under the collaboration with the Electric Carbon Nanomaterials (ECNM) group of University of Cambridge, UK. Compared to spinning and wet techniques, the CNT aerogel technique has several advantages, such as manufacturing ability of various products with morphology control as well as lower power usage needs and less need for equipment investment. My aerogel expertise can help the ECNM to understand better the formation mechanism of the CNT aerogel structures inside a reactor and produce longer and stronger CNT fibers. The CNT manufacturing system can be used for industrial scale-up with different applications such as composites, microelectronics, solar cells, energy storage and electronic components and defense and medical applications. There are a few laboratories in the world that can produce the CNT fibers using this aerogel technique and my lab is one of them. My long-term vision is to build up a CNT center at NUS.

## 9.2. Number of journal papers published and accepted for publication (international refereed journals and conference papers)

Publication	Total Publications (2005-2015)	Publications under NUS employment (2010- 2015)	Comments on Publications under NUS employment (2010- 2015)
Published international journals	42	31	These publications exclude 5 journals papers submitted
International conference papers	79	50	33 oral talks and 17 posters
Local/regional conference papers	10	4	1 oral talk and 3 posters
Patent	1	1	Granted on 6 Nov 2014 and patent commercialization license to Bronx Culture company, Singapore for mass production in Vietnam

## 9.3. List of keynote and invited presentations at international and local conferences

Publication	Total Publications (2005-2015)	Publications under NUS employment (2010- 2015)	Comments on Publications under NUS employment (2010- 2015)
Keynotes at international conferences	2	2	15 invited talks were accepted from more than 35 invitation emails under my name from USA, UK, South Korea, etc.
Invited talks at national conferences	6	6	
Invited talks at international conferences	7	7	

## 9.4. List of research prizes and awards

- Innovation and network award, CamBridgeSens, University of Cambridge, UK, in May 2010.
- Two 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.

## 9.5. List of three invited book chapters, which have been published

- DUONG\*, H M, Z FAN and T S NGUYEN, "Carbon Nanotube/Graphene Aerogels". In Graphene, Fullerenes, Nanotubes, and Nanodiamonds, Volume I ed., 557-572. The Carbon Nanomaterials Sourcebook. UK: Taylor & Francis (CRC Press), 2015. (Invited book chapter). The Book Editor is Professor Klaus Sattler, University of Hawaii, USA. Publication no. 0618781
- DUONG\*, H M and T S NGUYEN, "Advanced Cellulose and Polymer Aerogels for Building Heat Insulation". In Nano- and Biotech-Based Materials for Energy Building Efficiency, March 2016 ed.. USA: Springer, 2014. The Book Editor is Professor Fernando Pacheco Torgal, University of Minho, Portugal. Publication no. 0628263
- DUONG\*, H M and T S NGUYEN, "Green Recycled Cellulose Fibers from Paper Waste: Advanced Properties and Applications". In Green Polymer Composites Technology - Properties and Applications. UK: Taylor & Francis (CRC Press), 2014. The Book Editor is Professor Inamuddin, Aligarh Muslim University, India. Publication no. 0624455

## 9.6. Grant and journal referees:

I have been invited and have served as a reviewer for one FRC Tier 1 research proposal and total 77 manuscripts of 43 journals having high impact factors as below.

No.	Journal title	5 year IF <sup>c</sup>	Quantity
1	Advanced Materials	18.172	1
2	ACS Nano	13.774	1
3	Nano Energy	10.355	1
4	Journal of Chemistry of Materials	8.419	1

5	Journal of Materials Chemistry A	6.743	7
6	Carbon	6.638	6
7	ACS Applied Materials & Interfaces	5.908	4
8	Applied Energy	5.597	3
9	Nature - Scientific Reports	5.578	3
10	Journal of Physical Chemistry C	5.241	1
11	Carbohydrate Polymers	4.330	3
12	Chemical Engineering Journal	4.181	2
13	Composites Part A- Applied Science and Manufacturing	4.045	1
14	Journal of Nanotechnology	3.867	2
15	Applied Physics Letters	3.739	1
16	Materials and Design	3.626	1
17	Journal of Applied Physics	2.259	2
18	Materials	2.947	2
19	Journal of Nanoscale Research Letters	2.823	1
20	Macromolecular Materials and Engineering	2.779	1
21	International Journal of Thermal Science	2.732	1
22	Journal of Alloys and Compounds	2.716	1
23	Arabian Journal of Chemistry	2.684	1
24	Industrial & Engineering Chemistry Research	2.547	2
25	Reviews in Chemical Engineering	2.538	1
26	Journal of Physics D: Applied Physics	2.526	2
27	Colloids & Surfaces A: Physicochemical and Engineering Aspects	2.494	5
28	Applied Surface Science	2.469	1
29	Materials Letters	2.466	1
30	Energies	2.436	1
31	Journal of Physics: Condensed Matter	2.335	1
32	Journal of Materials Science	2.303	3
33	Polymers for Advanced Technologies	2.178	1
34	Journal of Applied Electrochemistry	2.089	1
35	Modelling and Simulation in Materials Science and Engineering	1.916	2
36	Materials Science and Engineering B	1.862	1
37	BioResources	1.798	2
38	Journal of Composite Materials	1.383	1
39	Fibers and Polymers	1.361	1
40	Advances in Polymer Technology	1.215	1
41	Water Science and Technology	1.208	1
42	Journal of Nanoscience and Nanotechnology	1.199	1
43	Environmental Engineering and Management Journal	0.946	1
		<b>TOTAL</b>	<b>77</b>

<sup>c</sup> Based on journal citation report 2014 on Web of Science (WoS)

#### 9.7. International conference committees:

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, September 27 - October 1, Australia

#### 9.7. Citations of papers, excluding self-citation and co-authored citation on 03/11/2015 <sup>d</sup>

Total number of ISI journal publications		Total number of ISI journal paper citation (excluding self-and co-authored citations)		Number of citations per paper	
From WoS	From Scopus	From WoS	From Scopus	From WoS	From Scopus

40	44	330	336	8.25	7.64
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<sup>d</sup> More details can be found in Appendix B11.

The top 10 citations of my papers generated from Scopus (ISI website) on 03/11/2015

No	Journals	Vol.	Year of Publication	Total hits	Cross-Citations	Self-Citations	Co-authored Citations
1	"High-yield Growth of Aligned Carbon Nanotubes on Ceramic Fibers for Multifunctional Enhancement of Structural Composites", Carbon. Publication no. 0538752.	47	2009	105	69	2	34
2	"Electrospun TiO <sub>2</sub> -Graphene Composite Nanofibers as a Highly Durable Insertion Anode for Lithium Ion Batteries", Journal of Physical Chemistry C. Publication no. 0563499.	28	2012	77	68	0	9
3	"Temperature-Dependent Phonon Conduction in Metalized Single Wall Carbon Nanotube Arrays", Nano Letters. Publication no. 0538745.	10	2010	33	20	1	12
4	"Random Walks in Nanotube Composites: Improved Algorithms and the Role of Thermal Boundary Resistance", Applied Physics Letters. Publication no. 0538760.	87	2005	33	16	11	6
5	"Computational Modeling of Thermal Conductivity of Single Walled Carbon Nanotube Polymer Composites", Nanotechnology. Publication no. 0538756.	19	2008	30	15	12	3
6	"Inter-carbon Nanotube Contact in Thermal Transport of Controlled-morphology Polymer Nanocomposites", Nanotechnology. Publication no. 0538749.	20	2009	28	11	7	10
7	"Morphology Effects of Aligned Single- and Multi-Walled Carbon Nanotube Arrays on Heat Conduction of Nanocomposites", Journal of Physical Chemistry C. Publication no. 0538746	114	2010	27	14	8	5
8	"Calculated Thermal Properties of Single Walled Carbon Nanotube Suspensions", Journal of Physical Chemistry C. Publication no. 0538756.	112	2008	24	10	6	8
9	"Morphology Control and Thermal Stability of Binderless-Graphene Aerogels from Graphite for Energy Storage Applications", Colloids and Surfaces A: Physicochemical and Engineering Aspects. Publication no. 0563532	414	2012	21	16	5	0
10	"Effective Heat Transfer Properties of Graphene Sheet Nanocomposites and Comparisons to Carbon Nanotube Composites", Journal of Physical Chemistry C. Publication no. 0538744	115	2011	19	14	2	3
<b>Candidate's h-index</b>				<b>13</b>	<b>10</b>	-	-

### 9.8. List of research grants secured:

Total amount of seven research grants is S\$6,023,508. Five research grants as a PI, totaling S\$2,347,096, and two research grants as a Co-PI, totaling S\$3,676,412 have been awarded.

Time	Role	Project title	Granting Organisation	Amount, S\$
2010 - 2013	PI	Physics, Nanostructured Transport and Engineering Applications of Carbon-based Nanomaterials	MOE Tier 1 (Start-up grant)	\$180,000

2012 - 2015	PI	Advanced Energy Devices Using Carbon Nanotube Aerogels	SERC 2011 Public Sector Research Funding (PSF) Grant	\$630,396
2014 - 2016	PI	Carbon Nanotube Fibers	Defence Research and Technology Office	\$1,025,000
2014 - 2015	PI	Super heat insulation, ultra lightweight, hydrophobic aerogels from environmental wastes for tropical climate usage	NRF POC 11th Grant	\$230,000
2012 - 2015	PI	Biodegradable, Flexible, and Ultrastrong Cellulose Aerogels from Paper Waste for Replacing Bubble Wrap and Cleaning Oil Spills	Environment Technology Research Program (7th RFP)	\$281,700
2015 - 2018	Co-PI	Mechanical Engineering Centre for Composites Engineering and Research	Office of DPRT	\$3,000,000
2015 - 2018	Co-PI	Integrated Phototherapy Device for Combined Photodynamic and Photothermal Therapy	MOE Tier 2	\$676,412
			<b>TOTAL:</b>	<b>\$6,023,508</b>

## 10. Service

As an assistant professor, I have served at the department, faculty and international levels. Since 2015, I have been the deputy lab supervisor of the Materials Science group. In that capacity, I have assisted Professor Lu Li, the lab supervisor, with: (i) approving chemical and equipment purchase and attending lab budget meetings, (ii) acting on his behalf when he is absent, (iii) hosting lab visitors and ensuring the labs are safe and health-risk free for students and visitors.

On the Faculty/University level, I reviewed a FRC Tier 1 proposal and have hosted several overseas academic visitors interested in the research collaboration with NUS. I collaborated with Associate Professor Jianyong Ouyang, Department of Materials Science and Engineering, on energy device development using carbon-based aerogels supported by SERC 2011 public sector research funding (2012-2015). Recently, Assistant Professor Kah Chen Yong James, Department of Biomedical Engineering, and I have collaborated to develop a computational code optimizing cancer treatment conditions using CNTs supported by the MOE tier 2 funding (2015 – 2018).

On the International level, I have contributed as a reviewer for 34 Journals with high impact factors such as ACS Nano and Journal of Chemistry of Materials. I have been a key member of the scientific journal (IJASAR) and the Functional Materials Society in Singapore, and assisted in organizing the international conferences (ICYRAM 2012 and SEA-JCCM 2015).