CANH MINH VU, PHD

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EDUCATION

Doctor of Philosophy in Polymer Science and Engineering **09/2017 – 08/2020**

Dissertation*: Graphene fluoride for thermoconductive nanocomposites*

Korea National University of Transportation, South of Korea

Master of Science in Polymer Science and Engineering **03/2015 – 08/2017**

Thesis: *Study on the thermally conductive pressure-sensitive adhesives composites based on graphene filler*

Korea National University of Transportation, South of Korea

Bachelor of Science in Chemical Engineering **08/2010 – 07/2014**

Thesis: *Green synthesis of lubricant oil from oleic acid*

Industrial University of Ho Chi Minh City, Vietnam

RESEARCH INTEREST

- Thermal Management Materials
- Electromagnetic Interference Shielding Materials
- Self-healing Composite Materials
- Additive Manufacturing (3D Printing)
- Energy Storage (Dielectric Capacitor, Supercapacitor, Battery)

PATENTS

1. S.R. Kim, **M.C. Vu**, Y.M. Kang, *Surface modified carbon flakes and the carbon brush motor using thereof*, Korean Patent No. **10-2098193**, 2020.
2. S.R. Kim, **M.C. Vu**, *Manufacturing method of SiC sheet and thermally conductive composites using thereof*, Korea Patent No. **10-2098090**, 2020.
3. S.R. Kim, **M.C. Vu**, *Multi-functional bioinspired paper for thermal management and electromagnetic interference shielding, method of fabrication for the same*, Korean Patent No. **10-2020-0124849**, 2020.
4. S.R. Kim, **M.C. Vu**, *Hybrid Thermal Management Film and Method of Fabrication for The Same*, US Patent No. 398.P007, filed July 2021.

GRANTS

1. Development of thermally conductive and yet electrically insulating pressure sensitive adhesives using 3D nanostructures, **2017R1A2B400520014**, Ministry of Education (Korea), Member, 2017/03/01-2022/02/28.
2. Development of thermally conductive film and bonding materials for display devices with in-plane thermal conductivity of 300 W/mK, **K_G012001108901**, Ministry of Trade, Industry & Energy, Member, 2020/04/01-2023/12/31.
3. Development of solvent-free adhesives with a peel strength of 3500 g/inch and property change with a timeless than 10% for electronic applications and processing technology using thereof, **K_G012001324801**, Ministry of Trade, Industry & Energy, Member, 2020/08/01-2022/12/31.
4. Development of stretchable thermally conductive pressure-sensitive adhesives for flexible display, **S2675429**, Ministry of SMEs and Startups, Member, 2018/12/12-2019/12/11.
5. Development of carrier-less flexible adhesive films for curved display applications with superhydrophobic of contact angle larger than 100 degree, **S2684557**, Ministry of SMEs and Startups, Member, 2018/12/01-2019/11/30.
6. Development of transparent medical patch using nanostructures, **2019011918**, Ministry of Education (Korea), Member, 2016/06/01-2019/05/31.

PEER-REVIEWED JOURNAL ARTICLES (Ctrl+Click to the title to open PDF)

1. **M.C. Vu**, T.H. Jeong, J.B. Kim, C.S. Lim, J.H. Lim, K.M. Kim, S.R. Kim, "*3D Structured Graphene Fluoride-based Epoxy Composites with High Thermal Conductivity and Electrical Insulation*" **Chem. Eng. J.,** 2021.

2. T.T.V. Tran, D.V.N. Vo, S.T. Nguyen, S.D.N. Luu, M. Mofijur, **C.M. Vu***, "*In situ sintered silver decorated 3D structure of cellulose scaffold for highly thermoconductive electromagnetic interference shielding epoxy nanocomposites",* **J. Appl. Polym. Sci**., 2021.

3. T.T.V. Tran, D.V.N. Vo, S.T. Nguyen, **C.M. Vu***, *"Silver nanowires decorated recycled cigarette filters based epoxy composites with high through-plane thermal conductivity and efficient electromagnetic interference shielding",* **Composites Part A**, 2021.

4. D. Mani, **M.C. Vu**, T.H. Jeong, J.B. Kim, C.S. Lim, J.H. Lim, K.M. Kim, S.R. Kim, "*3D Structured Graphene Fluoride-based Epoxy Composites with High Thermal Conductivity and Electrical Insulation*" **Comp. Part A,** 2021.

5. **M.C. Vu**, D. Mani, J.B. Kim, T.H. Jeong, S.M. Park, G. Murali, I.S. In, J.C. Won, D. Losic, C.S. Lim, S.R. Kim, "*Hybrid Shell of MXene and Reduced Graphene Oxide Assembled on PMMA Bead Core towards Tunable Thermoconductive and EMI Shielding Nanocomposites",* **Composites Part A**, 2021.

6. **M.C. Vu**, P.J. Park, S.R. Bae, S.Y. Kim, Y.M. Kang, W.K. Choi, M.A. Islam, J.C. Won, M.B. Park, S.R. Kim, *"Scalable ultrarobust thermoconductive nonflammable bioinspired papers of graphene nanoplatelets crosslinked aramid nanofibers for thermal management and electromagnetic shielding",* **J. Mater. Chem. A**, 2021.

7. **M.C. Vu**, T. H. Jang, C. B. Kim, W.K. Choi, D. H. Kim, S.R. Kim, "*3D printing of copper particles and poly(methyl methacrylate) beads containing poly(lactic acid) composites for enhancing thermo-mechanical properties",* **J. Appl. Polym. Sci**., 2020.

8. **M.C. Vu**, N.A.T. Thieu, W.K. Choi, M.A. Islam, S.R. Kim, "*Ultralight Covalently Interconnected Silicon Carbide Aerofoam for High Performance Thermally Conductive Epoxy Composites",* **Comp. Part A**, 2020.

9. **M.C. Vu**, I.H. Kim, W.K. Choi, C.S. Lim, M.A. Islam, S.R. Kim, "*Highly Flexible Graphene Derivative Hybrid Film: An Outstanding Nonflammable Thermally Conductive yet Electrically Insulating Material for Efficient Thermal Management",* **ACS Appl. Mater. Interface**, 2020.

10. **M.C. Vu**, W.K. Choi, S.G. Lee, P.J. Park, D.H. Kim, M.A. Islam, S.R. Kim, "*High Thermal Conductivity Enhancement of Polymer Composites with Vertically Aligned Silicon Carbide Sheet Scaffold",* **ACS Appl. Mater. Interface**, 2020.

11. **M.C. Vu**, N.A.T. Thieu, J.H. Lim, W.K. Choi, J.C. Won, M. A. Islam, S.R. Kim, *"Ultrathin Thermally Conductive Yet Electrically Insulating Exfoliated Graphene Fluoride Film for High Performance Heat Dissipation",* **Carbon**, 2020.

12. **M.C. Vu**, Q.V. Bach, D.D. Nguyen, T.S. Tran, M. Goodarzi, "*3D Interconnected Structure of PMMA Microbeads Coated with Copper Nanoparticles for Highly Thermal Conductive Epoxy Composites",* **Comp. Part B**, 2019.

13. **M.C. Vu**, Y.H. Bae, M.J. Yu, S.R. Kim, "*Thermally Conductive Adhesives from Covalent-Bonding of Reduced Graphene Oxide to Acrylic Copolymer",* **The Journal of Adhesion**, 2019.

14. **M.C. Vu**, Y.H. Bae, V.C Doan, S.R. Kim, "*Self-Assembly of Carbon Nanotubes and Boron Nitride via Electrostatic Interaction for High Thermal Conductivity and Electrical Resistivity Epoxy Composites",* **Macromol. Res.** (2018).

15. **M.C. Vu**, Y.H. Bae, M.J. Yu, V.C Doan, S.R. Kim, "*Core-Shell Structured Carbon Nanotube-PMMA Beads as Thermoconductive Filler in Epoxy Composites",* **Comp. Part A**, 2018.

16. **M.C. Vu**, G.D. Park, Y.H. Bae, S.R. Kim, "*Enhanced Thermal Conductivity of Pressure Sensitive Adhesives Using Hybrid Fillers of SiC Microparticle and SiC Nanoparticle Grafted Graphene Oxide",* **Polymer (Korea)**, 2016.

17. **M.C. Vu**, G.D. Park, Y.H. Bae, M.J. Yu, T.K. An, S.G. Lee, S.R. Kim, "*Pressure-Sensitive Adhesive Composites with a Hydrophobic Form of Graphene Oxide for Enhanced Thermal Conductivity",* **Macromol. Res.**, 2016.

18. N.A.T. Thieu, **M.C. Vu**, D.H. Kim, V.C. Doan, S.R. Kim, "*Effect of aspect ratio of vertically aligned copper nanowires in the presence of cellulose nanofibers on the thermal conductivity of epoxy composites",* **Polym. Adv. Tech**., 2020.

19. N.A.T. Thieu, **M.C. Vu**, E.S. Lee, V.C. Doan, S.R. Kim, "*Enhancement of Thermal Conductivity of Poly(methylmethacrylate) Composites at Low Loading of Copper Nanowires"*, **Macromol. Res.**, 2019.

20. V.C. Doan, **M.C. Vu,** M.A. Islam, S.R. Kim**,** *"Copper Flake-Coated Cellulose Scaffold to Construct Segregated Network for Enhancing Thermal Conductivity of Epoxy Composites"*, **Comp. Part B**, 2019.

21. V.C. Doan, **M.C. Vu,** M.A. Islam, S.R. Kim**, "***PMMA-Functionalized Reduced Graphene Oxide-Based Core-Shell Structured Beads for Thermally Conductive Epoxy Composites"*, **J. Appl. Pol. Sci.,** 2019.

22. M.J. Yu, M.C. Vu, H.J. Park, S.R. Kim, "*Fabrication and Characterization of the Nano-and Micro-Particles Applied Dry Adhesives"*, **J. Adhesion Interface,** 2019.

23. Y.H. Bae, M.J. Yu, **M.C. Vu**, S.R. Kim, "*Synergistic Effects of Segregated Network on PMMA Beads And Sintering of Copper Nanoparticles on Thermal and Electrical Properties of Epoxy Composites"*, **Com. Sci. Tech**., 2018.

24. M.J. Yu, T.S. Kwon, Y.H. Bae, M.C. Vu, S.R. Kim, "*Effects of Carbon-Based Nanofillers on the Structure and Property of Phenolic"*, **Polymer (Korea)**, 2018.

25. Y.H. Bae, G.D. Park, **M.C. Vu**, H.O. Jung, S.R. Kim, "*Thermal Conductivity Improvement by Cu Surface Treatments and Incorporation of PMMA Beads on the Cu/Epoxy Composites"*, **Polymer (Korea)**, 2016.

CONFERENCE PRESENTATIONS & TALKS

1. D. Mani, **M.C. Vu**, T.H. Jeong, C.B. Kim, S.R. Kim, "3D Network of Graphene Fluoride in Epoxy Composites for Significant Improved Thermal Conductivity and Electrical Insulation", Poster Presentation at *Autumn Meeting of the Polymer Society of Korea* (2021).

2. **M.C. Vu**, D. Mani, T.H. Jeong, C.B. Kim, S.R. Kim, "Enhanced thermal conductivity of composites with vertically aligned silicon carbide sheets", Poster Presentation at *Spring Meeting of the Polymer Society of Korea* (2021).

3. **M.C. Vu**, N.A.T. Thieu, D. Mani, S.R. Kim, "Ultrathin Thermoconductive and Electrically Insulating Exfoliated Graphene Fluoride Paper for High-performance Thermal Management Materials", Poster Presentation at *Fall Meeting of the Polymer Society of Korea* (2020).

4. **M.C. Vu**, S.R. Kim, "Functionalized Core-shell structure beads for epoxy composites with high thermal conductivity", Invited Oral Presentation at *ICERE* (2020) Vietnam.

5. N.A.T. Thieu, M**.C. Vu**, S.R. Kim, "Enhancement of Thermal Conductivity of Poly(methylmethacrylate) Composites at Low Loading of Copper Nanowires", Poster Presentation at *Autumn Meeting of the Polymer Society of Korea* (2019).

6. **M.C. Vu**, S.R. Kim, "Segregated Network of Decorated Copper Flakes on Cellulose Fiber for Improving Thermal Conductivity of Epoxy Composites", Poster Presentation at *Autumn Meeting of the Polymer Society of Korea* (2019).

7. **M.C. Vu**, S.R. Kim, "Encapsulated functionalized reduced graphene oxide on poly(methyl methacrylate) beads for thermally conductive epoxy composites", Poster Presentation at *Spring Meeting of the Polymer Society of Korea* (2019).

8. **M.C. Vu**, S.R. Kim, "Facile preparation of 3D structure of carbon nanotubes for highly thermal conductivity of epoxy composites", Poster Presentation at *European Materials Research Society* (2018) Poland.

9. **M.C. Vu**, Y.H. Bae, M.J. Yu, S.R. Kim, "Self-Assembly of Carbon Nanotubes and Boron Nitride via Electrostatic Interaction for Epoxy Composites of High Thermal Conductivity and Electrical Resistivity", Poster Presentation at *Autumn Meeting of the Polymer Society of Korea* (2018).

10. **M.C. Vu**, S.R. Kim, "Self-Assembly of Carbon Nanotubes and Boron Nitride via Electrostatic Interaction for Epoxy Composites of High Thermal Conductivity and Electrical Resistivity", Poster Presentation at I*nternational Conference on Materials Science and Nanotechnology* (2018) China.

11. **M.C. Vu**, Y.H. Bae, M.J. Yu, S.R. Kim, "Pressure-sensitive adhesive composites with a hydrophobic form of graphene oxide for enhanced thermal conductivity", Poster Presentation at *Pure and Applied Chemistry International Conference* (2018) Thailand.

12. **M.C. Vu**, S.R. Kim, "Thermally conductive pressure-sensitive adhesive composites using functionalized graphene oxides", Oral Presentation at *Spring Meeting of the Polymer Society of Korea* (2017).

13. **M.C. Vu**, G.D. Park, Y.H. Bae, M.J. Yu, S.R. Kim, "Improvement of thermal conductivity of pressure-sensitive adhesive composites using chemically functionalized graphene oxide and in-situ polymerization", Poster Presentation at *Spring Meeting of the Society of Adhesion and Interface* Korea (2017).

14. **M.C. Vu**, G.D. Park, Y.S. Song, H.J. Lee, Y.H. Bae, M.J. Yu, S.R. Kim, "Pressure-sensitive adhesive composites with a hydrophobic form of graphene oxide for enhanced thermal conductivity", Poster Presentation at *IUPAC-FAPS* Polymer Congress on Smart Materials for Emerging Technology (2017) Korea.

15. **M.C. Vu**, G.D. Park, Y.S. Song, H.J. Lee, Y.H. Bae, M.J. Yu, S.R. Kim, "Enhanced thermal conductivity of pressure-sensitive adhesives using hybrid fillers of SiC microparticle and SiC nanoparticle grafted graphene oxide", Poster Presentation at *IUPAC-PSK40* Conference On Advanced Polymeric Materials (2016) Korea.

PROFESSIONAL & RESEARCH EXPERIENCE

Postdoctoral Fellow — 09/2020 – Present

Polymer Materials Lab, Department of Polymer Science and Engineering
Korea National University of Transportation, South of Korea
Advisor: Sung-Ryong Kim, Professor and Dean of College

- Preparation of binary fillers of liquid metal and 1D and/or 2D materials (carbon nanotubes, boron nitride nanosheets, graphene derivatives sheets) for thermoconductive, stretchable, self-healable polyurethane composites.
- Development of aramid nanofibers (Kevlar fiber) and hybrid with 1D and/or 2D materials for high-performance of highly thermal conductivity, excellent flame retardant, and electromagnetic shielding interference materials.
- Fabrication and characterization of graphene fluoride sheets for highly thermoconductive yet electro-insulating hybrid films as the heat spreader in wearable electronic devices.

Graduate Research Assistant — 03/2015 – 08/2020

Polymer Materials Lab, Department of Polymer Science and Engineering
Korea National University of Transportation, South of Korea
Advisor: Sung-Ryong Kim, Professor and Dean of College

- Fabrication of 3D structure of boron nitride, boron nitride nanotubes sponges, silicon carbide sheets scaffold.
- Development of dry adhesives based on the structural surface of PDMS for medical application.
- Apply 3D printing technology (directed inkjet, FDM) for the preparation of thermoconductive polymer composites.
- Synthesis and characterization of UV-crosslinked pressure-sensitive adhesive (PSA).

Visiting Company, Project Program — 08/2019 – 09/2019

Seil Hi-Tec company, Cheongwon-gun, Chungbuk, South of Korea
Advisor: Kim Min-Soo, Dr. and Director of R&D, Team of Film.

- Understanding and fabricating the thermoconductive pressure-sensitive adhesives

TEACHING & MENTORING EXPERIENCE

Advisor and Mentor for Undergraduate/Graduate Research Assistant — 03/2015 – Present

At the Polymer Materials Lab, Department of Polymer Science and Engineering
Korea National University of Transportation, South of Korea

Dr. Tran Thi Tuong Vi, Researcher and Lecturer at Nguyen Tat Thanh University
- Advisor from Feb 2019 to present
- Synthesis and characterization of nanoparticles for thermoconductive polymer composites with excellent EMI shielding

- For her research, Dr. Vi got two peer-reviewed journal articles.

Mr. Tae-Hyeong Jeong, BS and MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-advisor from Sep 2019 to present
- Direct on 3D printing for the fabrication of thermally conductive polymer composites.
- For his research, Mr. Jeong got one peer-reviewed journal articles
  - Project: *Development of thermally conductive film and bonding materials for display devices with in-plane thermal conductivity of 300 W/mK*

Mr. Jun-Beom Kim, BS and MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-advisor from Sep 2019 to present
- Direct on 3D printing for the fabrication of thermally conductive polymer composites.
- For his research, Mr. Kim got one peer-reviewed journal articles
  - Project: *Development of thermally conductive film and bonding materials for display devices with in-plane thermal conductivity of 300 W/mK*

Mr. Dineshkumar Mani, Ph.D. Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-advisor from Sep 2018 to present
- Direct on fabrication and functionalization of 2D nanomaterials for thermal conductive polymer composites.
- For his research, Mr. Mani got one peer-reviewed journal articles
  - Project: *Development of thermally conductive and yet electrically insulating pressure sensitive adhesives using 3D nanostructures*

Ms. Nhat Anh Thi Thieu, MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-advisor Thieu's Graduate Engineering Thesis from September 2018 to Feb 2021
- Direct on fabrication and functionalization of nanoparticles for thermal conductive polymer composites.
- For her research, Ms. Thieu got two peer-reviewed journal articles
  - *Thesis: Enhancement thermal conductivity of polymer-based composites by constructing the interconnected networks of nanofillers.*

Mr. Vu Chi Doan, MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-advisor Doan's Graduate Engineering Thesis from Mar 2016 to Mar 2019
- Direct on fabrication and functionalization of 2D nanomaterials for thermal conductive polymer composites.
- For his research, Mr. Doan got two peer-reviewed journal articles
  - Thesis: *Continuous filler networks for enhanced thermal conductivity in epoxy-based composites.*

Mr. Young-Han Bae, BS and MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-mentored Bae's Graduate Engineering Thesis from September 2016 to May 2018
- Direct on fabrication and functionalization of nanoparticles for thermal conductive polymer composites
- For his research, Mr. Bae got three peer-reviewed journal articles
  - Thesis: *Thermal conductivity improvement by synergistic effects of segregated network and surface treatment of Cu fillers*

Ms. Min-Ji Yu, BS and MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-mentored Yu's Graduate Engineering Thesis from Mar 2017 to Feb 2018
- Direct on the fabrication of 2D nanomaterials for phenolic foam
- For her research, Ms. Yu got two peer-reviewed journal articles
  - Thesis: *Effect of nanofillers on the properties of the phenolic foam*

Ms. Ye-Seul Song, MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-mentored Song's Graduate Engineering Thesis from September 2016 to May 2017
  - Thesis: *Bimetallic nanoparticle composite counter electrode for dye-sensitized solar cells*

Ms. Hee-Jin Lee, MS Student at Dept. of Polymer Sci. and Eng., Korea Nat. Uni. Of Transportation
- Co-mentored Lee's Graduate Engineering Thesis from September 2016 to May 2017
- For her research, Ms. Lee got one peer-reviewed journal articles
  - Thesis: *Ultrasmooth transparent conductive hybrid films of reduced graphene oxide and single-walled carbon nanotube by ultrasonic spraying*

Teaching Fellow, Polymer Composites for Thermal Management 03/2021 – 06/2021

Department of Polymer Science and Engineering, Korea National University of Transportation, South of Korea

- Envision, design, and prepare lectures, assignments, interactive in-lecture activities, and exams for this new foundational course for graduate students concentrating in polymer science and engineering.
- Grading assignments, exams, projects, holding review sessions and office hours, and collecting documentation.
- Received an Overall Teaching Fellow Performance Evaluation of "Very Good" (4.5/5.0) from student reviews.

Teaching Fellow, Introduction to Polymeric Materials 09/2020 – 12/2020

Department of Polymer Science and Engineering, Korea National University of Transportation, South of Korea

- Developed and organized the in-class activities and demos.
- Hosted laboratory sections and the final exam review session.
- Received an Overall Teaching Fellow Performance Evaluation of "Very Good" (4.0/5.0) from student reviews.

Summer Instructor **05/2017 – 07/2017**

Dalchoel Highschool, Chungju, South of Korea

- Developed a curriculum and lessons for, "Hands-On 3D Printing: Experiencing the Third Dimension," a week-long, full-day summer camp on 3D printing for highschool students interested in science and engineering.
- Served as a co-instructor for the camp in July 2017 and provided the campers with hands-on introductory tutorialson CAD design, lead round-table discussion and group ideation sessions on the prospects, imminent challenges, and engineering considerations associated with additive manufacturing, and hosted a tour of Prof. Sung-Ryong Kim's laboratory, complete with interactive and live demonstrations of microscale 3D printing techniques.

PROFESSIONAL AND ACADEMIC SERVICE

Guest Editor

- *Micromachines*

Journal Referee and Reviewer

- *ACS Nano*
- *Chemical Engineering Journal*
- *ACS Applied Materials Interfaces*
- *Composites Part A*
- *Composites Part B*
- *2D Materials*
- *Journal of Applied Polymer Science*
- *Macromolecular Research*

OUTREACH

Organizer and Instructor, 3D Printing for Polymer Composites Workshop **10/2018 – 11/2018**

Department of Polymer Science and Engineering, Korea National University of Transportation, South of Korea

- Worked with the Innovation Research Science and Engineering Center to host 98 high school students from the Chungju area for an all-day outreach event.
- Activities included an interactive lecture on 3D printing, live demonstrations with researchers from the Polymer Materials Lab, hands-on CAD activities, and custom design of cooling fin that all program participants 3D printed.

REFERENCES

Prof. Sung-Ryong Kim

Department of Polymer Science and Technology, Korea National University of Transportation, Republic of Korea

Email: srkim@ut.ac.kr

Prof. Md. Akhtarul Islam

Department of Chemical Engineering and Polymer Science, Shahjalal University of Science and Technology, Bangladesh

Email: islamsust@yahoo.com

Prof. Nguyen Thanh Son

National Institute of Technology, Kushiro College, Japan

Email: son@kushiro-ct.ac.jp

Dr. Tran Thanh Tung

School Of Chemical Engineering & Advanced Materials, The University Of Adelaide, Australia

Email: tran.tung@adelaide.edu.au