Nancy Sowan

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Full time lecturer and scientist specialized in developing adaptable, photo-curable, smart materials with high T_g and superior mechanical properties for industrial applications. Experienced in utilizing testing methods such as 3-point bending, creep, failure analysis, and aging studies to investigate the effect of dynamic bond exchange on both mechanical and thermodynamic materials properties. Accomplished fourteen publications in relevant high-quality journals with more than 400 citations and US patent application. Demonstrate a notable aptitude for both working independently and collaborating with other scientists to achieve research goals. Fluent in both English and Arabic.

EDUCATION

- Dec. 2019: **Ph.D. Chemistry**, University of Colorado at Boulder, Boulder, CO, USA.
  Advisor: Professor Christopher Bowman.
  Thesis title: Using Dynamic Covalent Chemistry in Crosslinked Glassy Polymers to Achieve Stress Relaxation and Improve Material Performance
- May 2017**: M.Sc. degree in Material Science,** University of Colorado at Boulder, Boulder, CO, USA.
- Jan. 2011: **B.S., Chemistry**, University of Jordan, Amman, Jordan.

INSTRUMENTAL PROFICIENCIES

- Fourier Transform Infrared spectroscopy (FTIR), UV/Vis Spectroscopy, Differential Scanning Calorimetry (DSC), Nuclear Magnetic Resonance spectroscopy (NMR), Rheometry, Tensometry, Dynamic Mechanical Thermal Analysis (DMTA), Micro X-ray Computed Tomography, Column Chromatography, Thermogravimetric Analysis (TGA), Optical Microscopy.

PROFFESIONAL EXPERIENCE

- ➢ **Full time lecturer, Chemistry Department, College of Science, University of Jordan, Jordan, Amman, 2024**

- ➢ **Research Assistant, Bowman Research Group, University of Colorado at Boulder, CO, 2014 – 2021**
- Monomer synthesis and characterization (NMR, FT-IR).
- Photopolymer network formulations and particle surface functionalization.
- Developing unique stimuli-responsive polymer composites.
- Dynamic and mechanical characterization of polymer composites.
- Photopatterning and light-activated shape reconfiguration.
- Maintaining instruments including tensometer, DMTA, MTS and FT-IR for operations and uses.
- Engaged in research collaborations project meetings with Project Leaders at NIST, Georgia tech university.
- Managed a five-year NIH research project for developing novel dental restorative materials involving multidisciplinary research collaborations with four universities (CU Denver, MSU Denver, UDel, and UMich).

PUBLICATIONS

- **Sowan, N.**; Song, H.B.; Cox, L.M.; Patton, J.R.; Fairbanks, B.D.; Ding, Y.; Bowman, C.N. Light-activated stress relaxation, toughness improvement, and photoinduced reversal of physical aging in glassy polymer networks. *Advanced Materials*, 33 (5), 2007221 (2021).
- Bowman, C.N.; **Sowan, N.**; Cox, L.M. Tough, healable composites displaying stress relaxation at the resin-filler interface. *US Patent App*. 16/982, 393, (2021).
- Song, H.B.; **Sowan, N.**; Baranek, A.; Sinha, J.; Cook, W.D.; Bowman, C.N. Effects of network structures on tensile toughness of copper-catalyzed azide-alkyne cycloaddition (CuAAC)-based photopolymers. *Macromolecules,* 54 (2), 747-756 (2021).
- **Sowan, N.;** Lu, Y.; Kolb, K.J; Cox, L.M.; Long, R.; Bowman, C.N. Enhancing the toughness of composites via dynamic thiol–thioester exchange (TTE) at the resin–filler interface. *Polymer Chemistry,* 11 (29), 4760-4767 (2020).
- **Sowan, N.;** Dobson, A.; Podgorski, M; Bowman, C.N. Dynamic covalent chemistry (DCC) in dental restorative materials: implementation of a DCC-based adaptive interface (AI) at the resin–filler interface for improved performance. *Dental Materials,* 36 (1), 53-59(2020).
- Cox, L.M.; Martinez A.M.; Blevins, A.K; **Sowan, N.**; Ding,Y.; Bowman, C.N. Nanoimprint lithography: Emergent materials and methods of actuation. *Nano Today* 31, 100838 (2020).
- Gao, G.; Han, H.; **Sowan, N.**; Zhang, X.; Shah, P.K.; Chen, M.; Bowman, C.N.; Stansbury, J. W. Stress Relaxation via Covalent Dynamic Bonds in Nanogel-Containing Thiol–Ene Resins. *ACS Macro Letters* 9 (5), 713-719 (2020).
- McBride, M.K; Worrell, B.T.; Brown, T.; Cox, L.M.; **Sowan, N.**; Wang, C.; Podgorski, M.; Martinez, A.M.; Bowman, C.N. Enabling applications of covalent adaptable networks. *Annual review of chemical and biomolecular engineering* 10, 175-198 (2019).
- **Sowan, N.**; Cox, L. M.; Shah, P. K.; Song, H. B.; Stansbury, J. W.; Bowman, C. N. Dynamic Covalent Chemistry at Interfaces: Development of Tougher, Healable Composites through Stress Relaxation at the Resin–Silica Nanoparticles Interface. *Adv. Mater. Interfaces* **2018**, 1800511.
- McBride, M. K; Worrell, B. T.; Brown, T.; Cox, L. M.; **Sowan, N.**; Wang, C.; Podgorski, M.; Martinez, A. M.; Bowman, C. N. Enabling Applications of Covalent Adaptable Networks. *Annual review of chemical and biomolecular*. **2019**,10.
- Song, H. B.; **Sowan, N.;** Shah, P. K.; Baranek, A.; Flores, A.; Stansbury, J. W.; Bowman, C. N. Reduced Shrinkage Stress via Photo-Initiated Copper(I)-Catalyzed Cycloaddition Polymerizations of Azide-Alkyne Resins. *Dental Materials*. **2016**, 32, 1332-1342.
- Cox, L. M.; Sun, X.; Wang, C.; **Sowan, N.;** Killgore, J. P.; Long, R.; Wu, H. A.; Bowman, C. N.; Ding, Y. Light-Stimulated Permanent Shape Reconfiguration in Cross-Linked Polymer Microparticles. *ACS Appl. Mater. Interfaces* **2017**, *9* (16), 14422–14428.
- Mu, X.; **Sowan, N.**; Tumbic, J. a.; Bowman, C. N.; Mather, P. T.; Qi, H. J. Photo-Induced Bending in a Light-Activated Polymer Laminated Composite. *Soft Matter* **2015**, *11* (13), 2673–2682.
- Zhao, Z.; Mu, X.; **Sowan, N.;** Pei, Y.; Bowman, C.N.; Qi, H.J.; Fang, D. Effects of Oxygen to the Light Activation in Covalent Adaptable Network Polymers. Soft Matter, **2015**, *11*, 6134-6144.
- Cox, L. M.; Li, Z.; **Sowan, N.;** Nair, D.; Xiao, J.; Bowman, C. N.; Ding, Y. Reconfigurable Surface Patterns on Covalent Adaptive Network Polymers Using Nanoimprint Lithography. *Polymer* **2014**, *55* (23), 5933–5937.
- Alzahrani, A. A.; Saed, M.; Yakacki, C. M.; Song, H. B.; **Sowan, N.;** Walston, J. J.; Shah, P. K.; McBride, M. K.; Stansbury, J. W.; Bowman, C. N. Fully Recoverable Rigid Shape Memory Foam Based on (CuAAC) Using a Salt Leaching Technique. *Polym. Chem.* **2018**, *9* (1), 121–130.

SELECTED ORAL PRESENTATIONS

- **Sowan, N.**; Bowman, C.N. Application of reversible addition-fragmentation chain transfer (RAFT) in covalent adaptable networks (CANs). American Chemical Society (ACS), Washington, D.C., August, 2017.

- **Sowan, N.**; Cox, L.M; Ding, Y.; Bowman C.N. Applications of addition fragmentation chain transfer. American Chemical Society (ACS), Denver, CO, March 2015.
- **Sowan, N.**; Cox, L.M.; Mu, X.; Qi, J.; Ding, Y.; Bowman, C.N. Applications of addition fragmentation chain transfer. Industry/University Cooperative Research Centers (IUCRC), Seattle, WA, 2015.