1-1-2022

# Graphene in Bio-derived Polyurethane for Improved Mechanical Properties

Vishwa Suthar

Magdalene Asare

Ram Gupta

# graphene oxide in bio-derived polyurethane for improved mechanical properties

**Vishwa Suthar, Magdalene A. Asare and Ram K. Gupta**

[1] Department of Chemistry, Pittsburg State University, 1701 S Broadway St, KS, 66762

## Introduction

- The synthesis of most polymers is highly dependent on petroleum sources
- This fast depletion impacts the environment
- Scientists are presently working on bio-based alternatives especially for polyurethane
- Polyurethanes have vast applications in medical devices, sports, automobiles and in homes

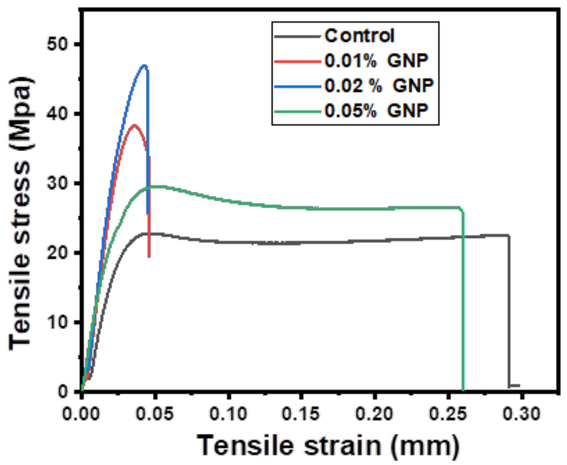
## Solutions in Our Work

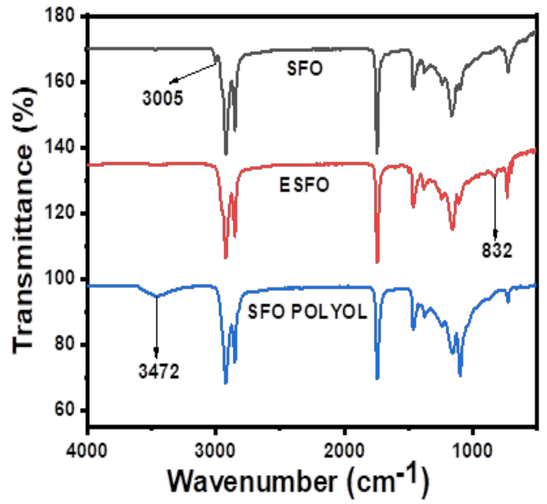
- A replacement of petroleum-based oil with sunflower oil in the production of polyurethane
- Synthesis of a bio-based polyol with epoxidation followed by ring-opening reaction
- The addition of graphene to improve the mechanical properties of the sample

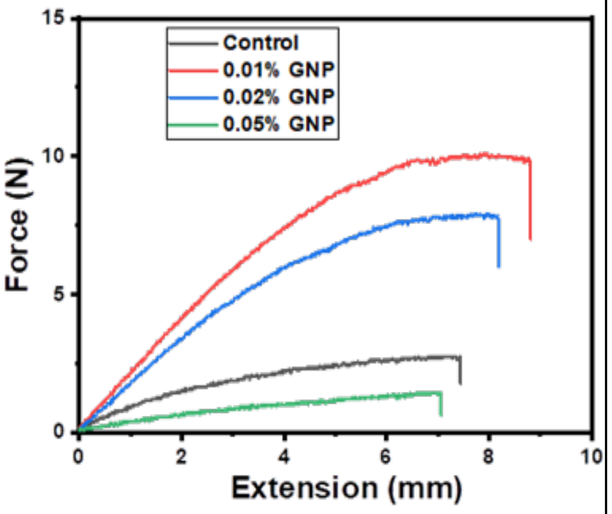
## Method and materials

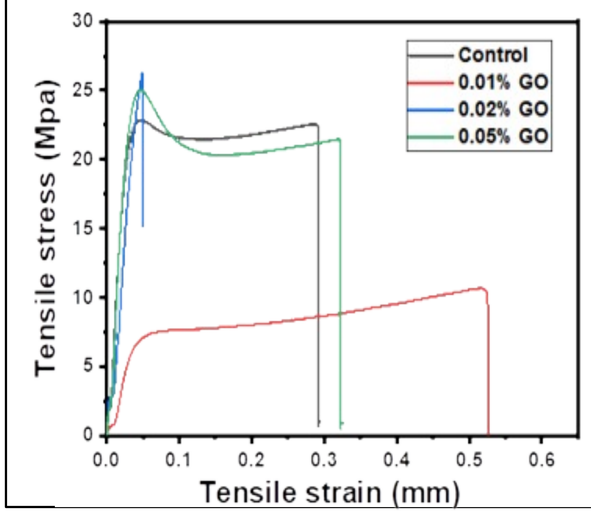
One-step reaction with graphene & isocyanate

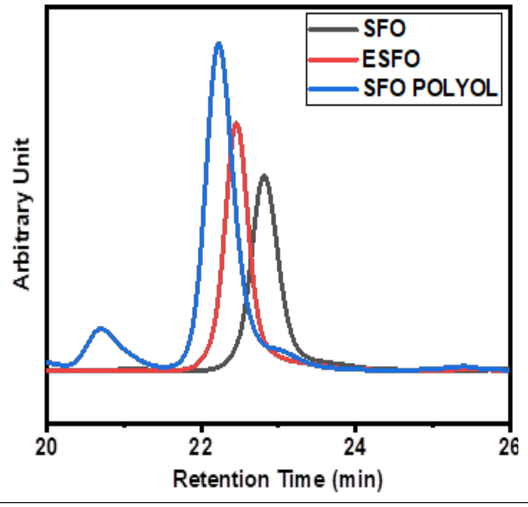
## Results and discussion

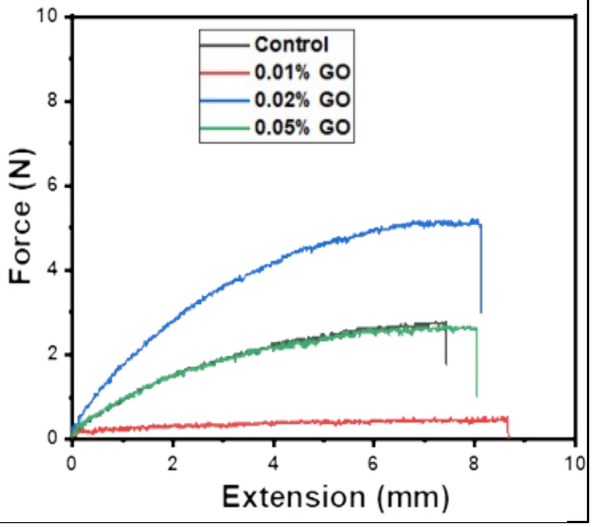



## Summary

- The sunflower-based polyurethane was more flexible with the addition of graphene oxide
- Thermal gravimetric analysis (TGA) showed that the synthesized bio-based polyurethane composite with graphene had improved
- The highest tensile strength and elastic modulus were attempted 47 MPa and 450 MPa respectively

## Acknowledgement

- Sincere acknowledgment to the Polymer Chemistry Program and Kansas Polymer Research Center for their facilities and financial support