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### Bio-based coating of modified limonene via UV light technology

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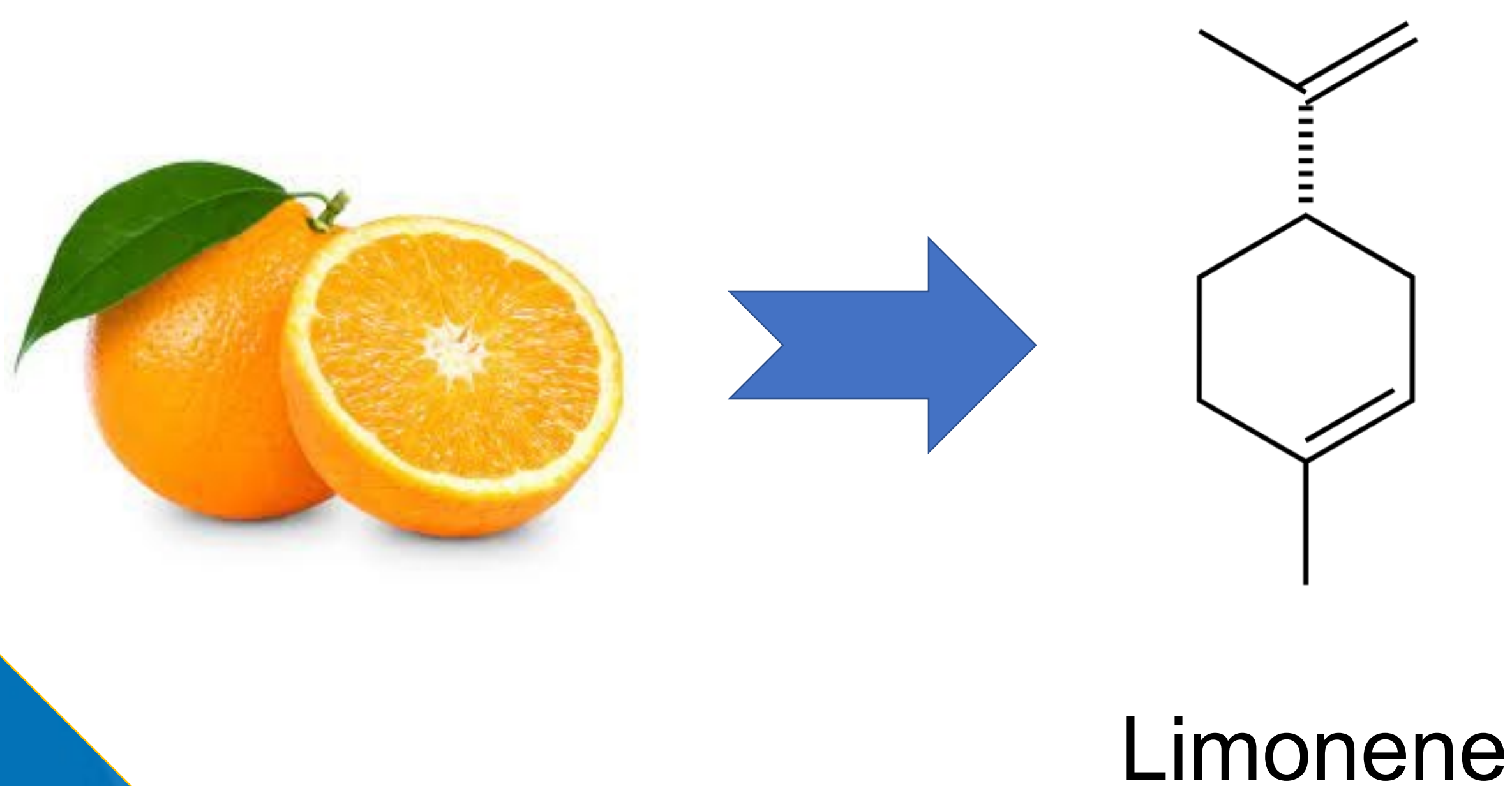


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## Introduction

### □ Aim :-

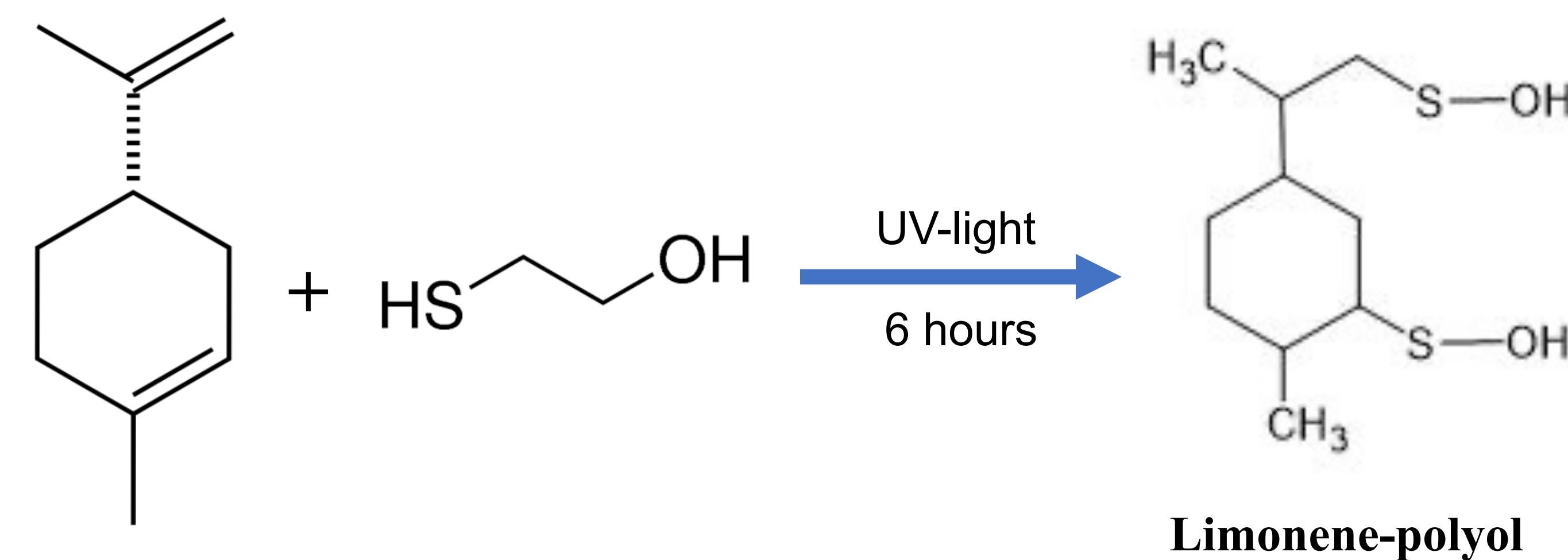
- Exercise Bio-based commodities instead of Petroleum-based for Coating Application.
- Increase mechanical properties like Tensile and Flexural by increasing cross-linking.
- Decrease the usage of cross-link agent with increasing methacrylated limonene-polyol.
- Fast curing process via UV light.
- Increase hardness of coated film.



## Experiment

### □ Thiol-ene reaction :-

- Hydroxyl functional groups held by the structure of limonene. (OH-value = 275.16)



### □ Methacrylation :-

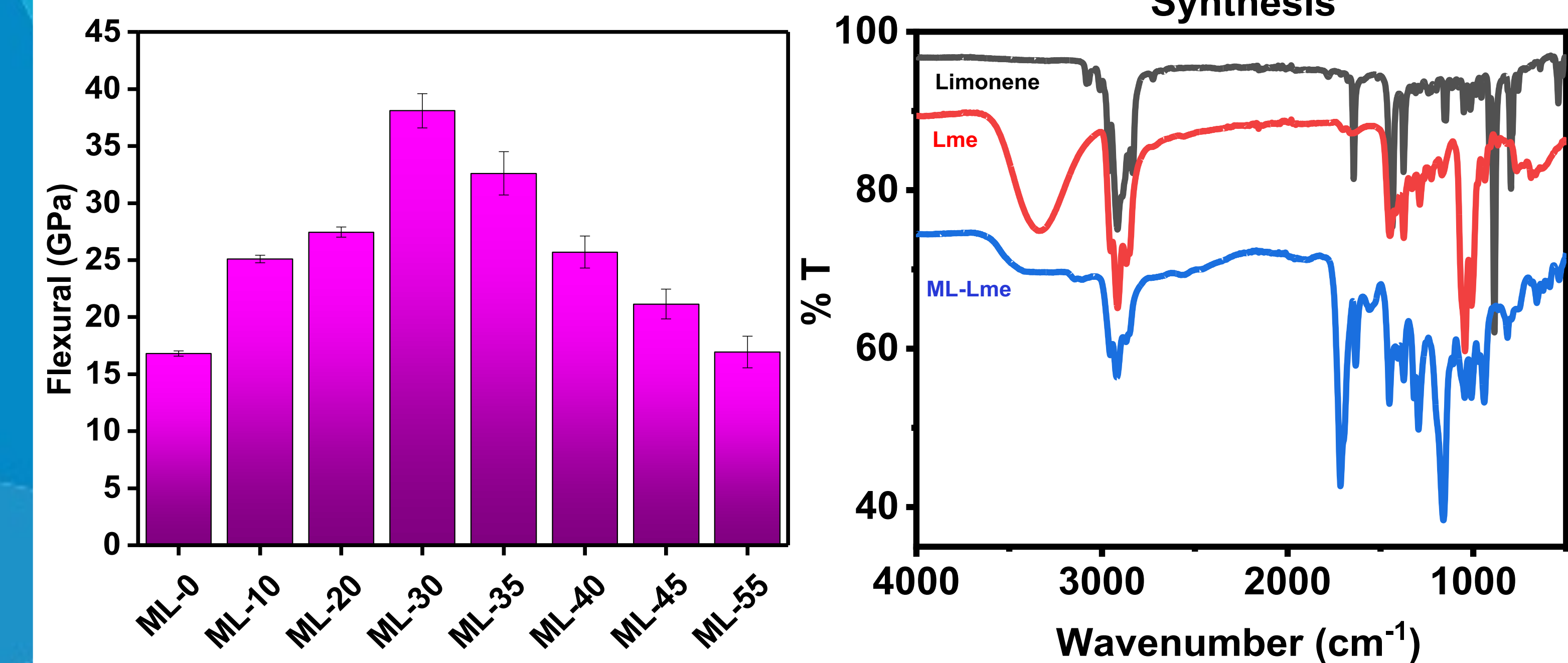
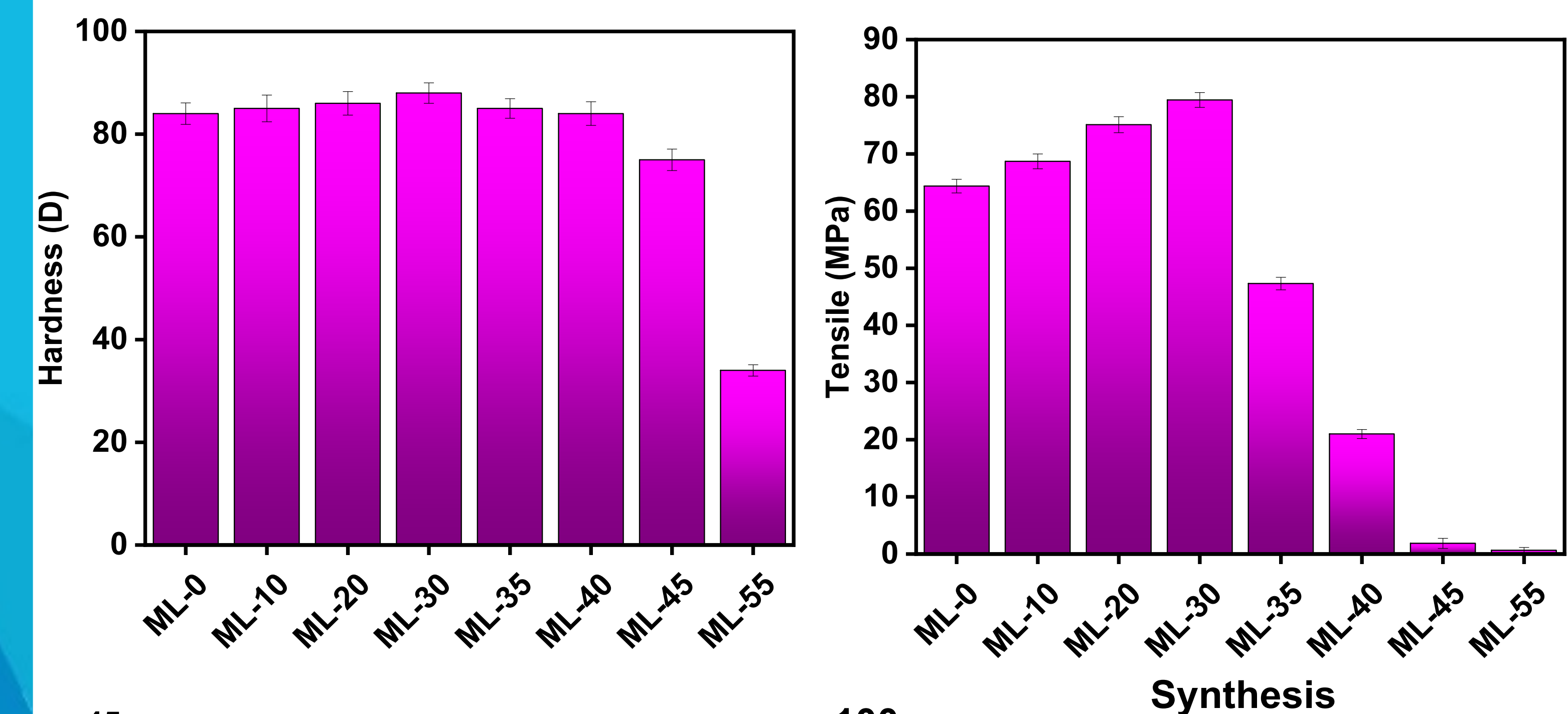
- Limonene-polyol was **methacrylate** with methacrylic anhydride through an **esterification** reaction to proceed further for UV curing formulation.



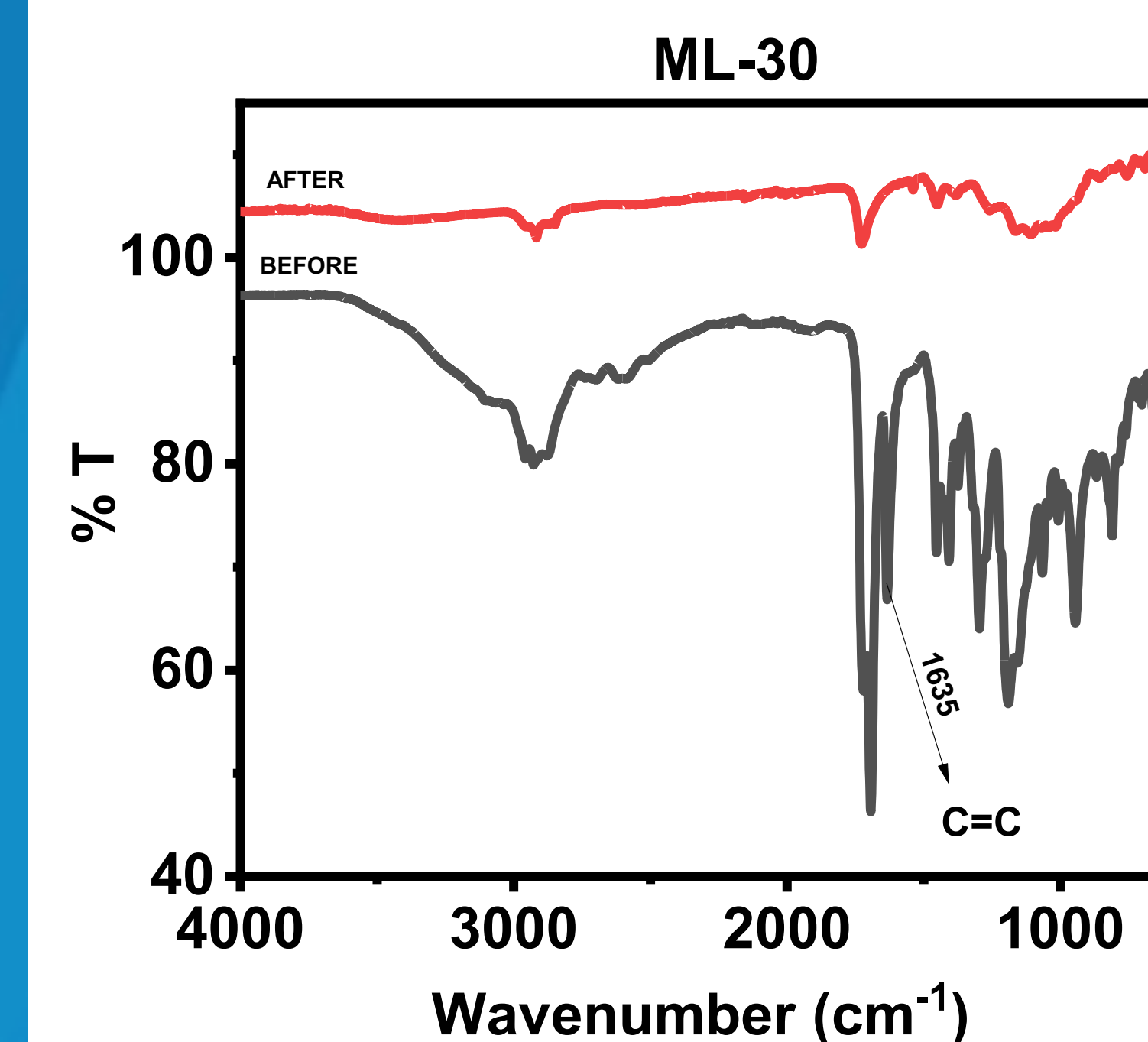
- ❖ Curing formulation is applied on surface of steel and wood.
- ❖ In picture, curing formulation cured in petri dish for characterization of coted material.

## Results

- Coated material characterized by **hardness test, Tensile, Flexural and TGA** analysis.



- During synthesis procedure, synthesized materials also characterized by **FT-IR analysis**.



- All sample is cured under UV-light for 8 second and cure percentage noticed around 92%.

## Summary

- Strong tensile strength observed at 79 Mpa by increasing the 30% of bio-based product and bending modulus observed at 38 Gpa.
- In future, we are planning to increase the amount of bio-based product in coating formulation.

## Acknowledgment

- Kansas Polymer Research Center
- Pittsburg State University