

# PHOTORHEOMETRIC STUDY OF VANILLIN ACRYLATE-BASED RESINS AND ANTIMICROBIAL PROPERTIES OF POLYMERS

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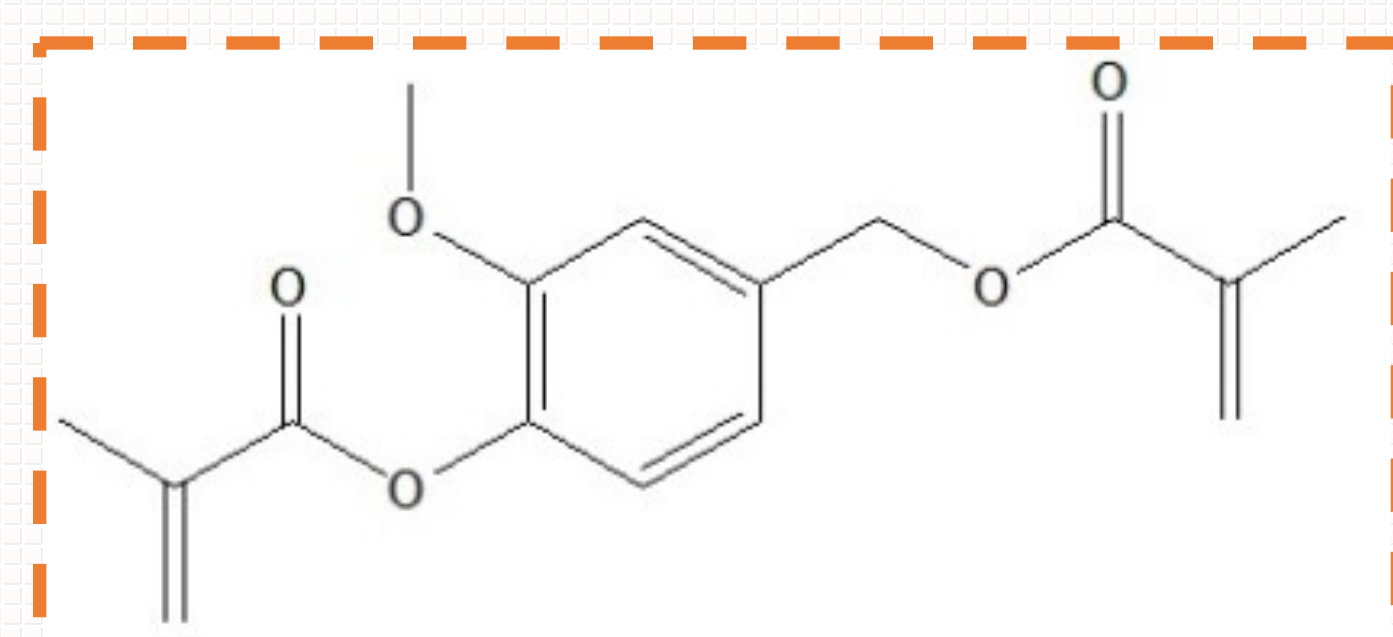
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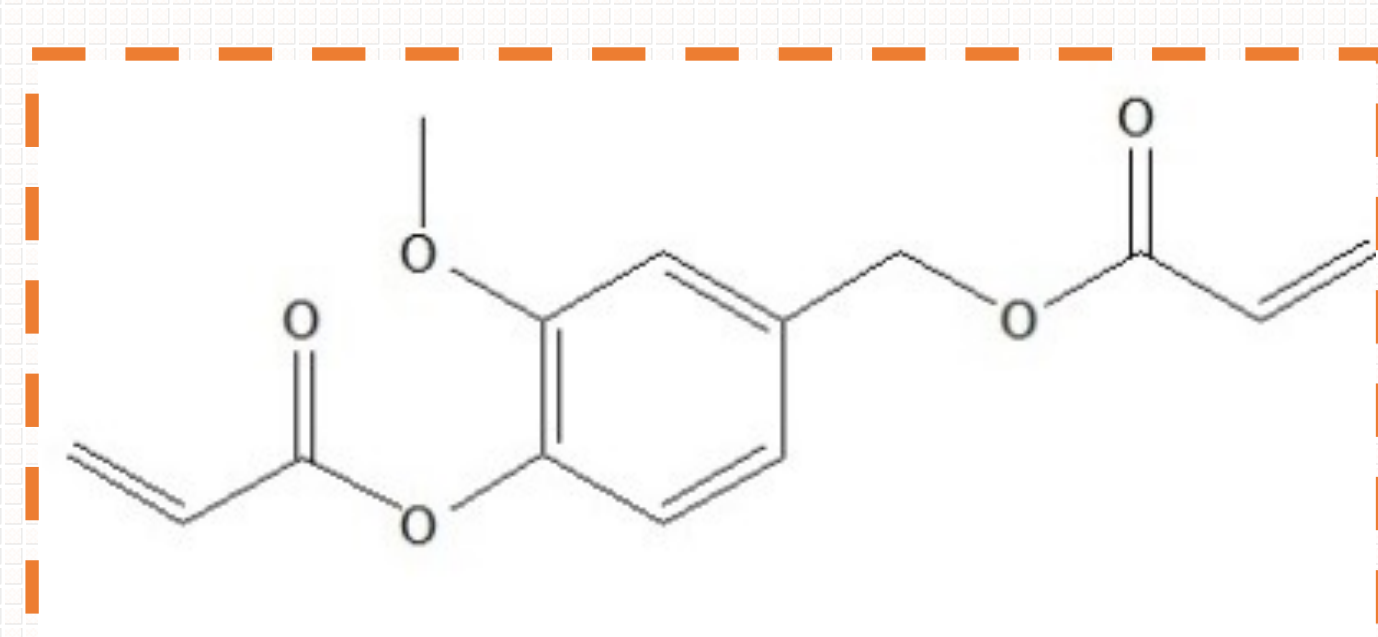
## THE AIM

The aim of this work was to investigate the kinetics of free-radical and thiol-ene photopolymerization of vanillin diacrylate (VD) and vanillin dimethacrylate (VDM) using phenylbis(2,4,6-trimethylbenzoyl)phosphine oxide (BAPO) as photoinitiator, as well as rheological properties of the photocross-linked polymers by real-time photorheometry. The influence of the resin composition to UV/VIS curing time and rigidity of the resulting polymers was investigated.

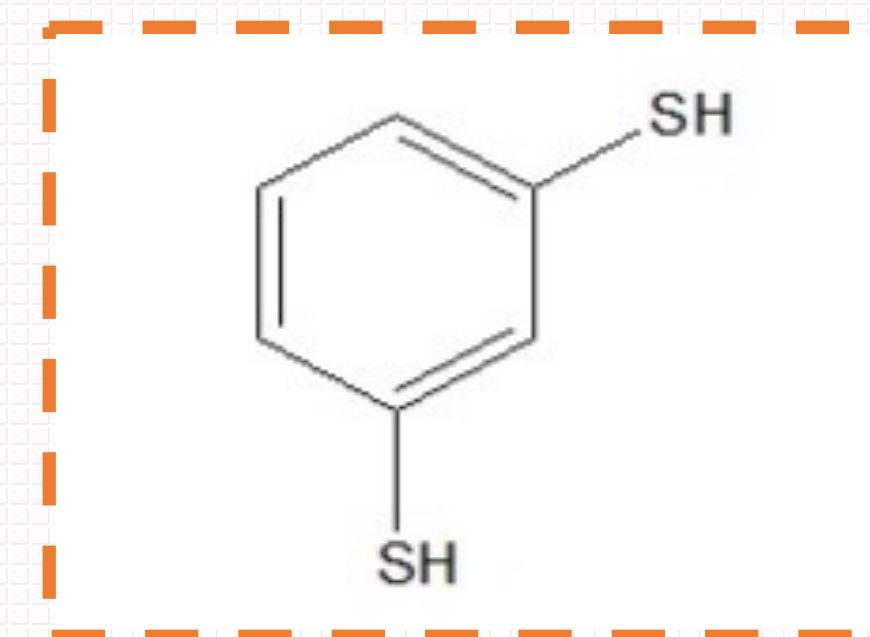
## MATERIALS



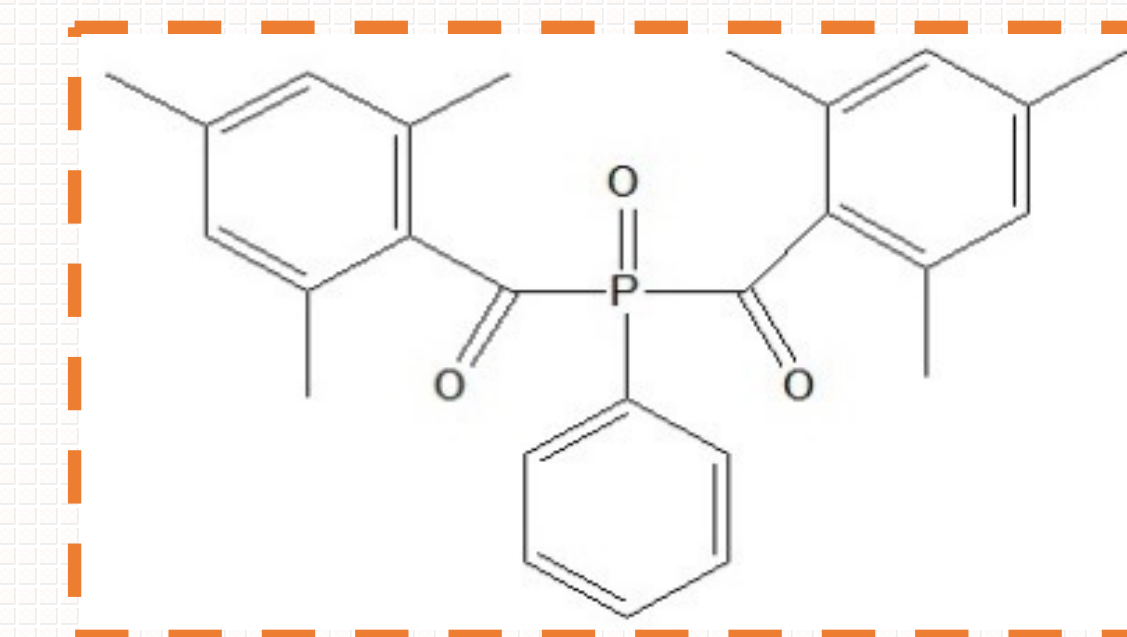
vanillin dimethacrylate (VDM)



vanillin diacrylate (VD)



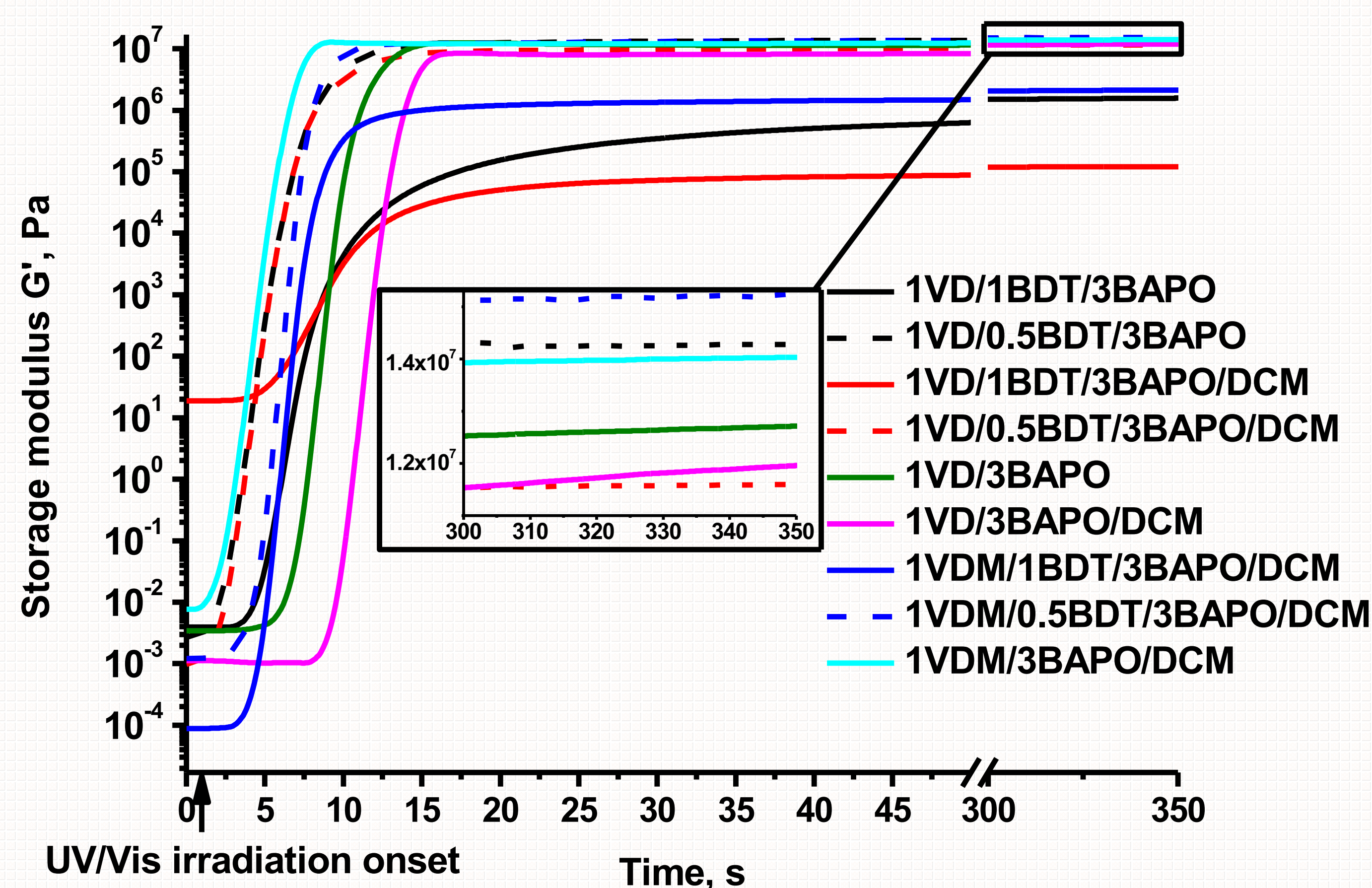
1,3-benzenedithiol (BDT)



phenylbis(2,4,6-trimethylbenzoyl)phosphine oxide (BAPO)

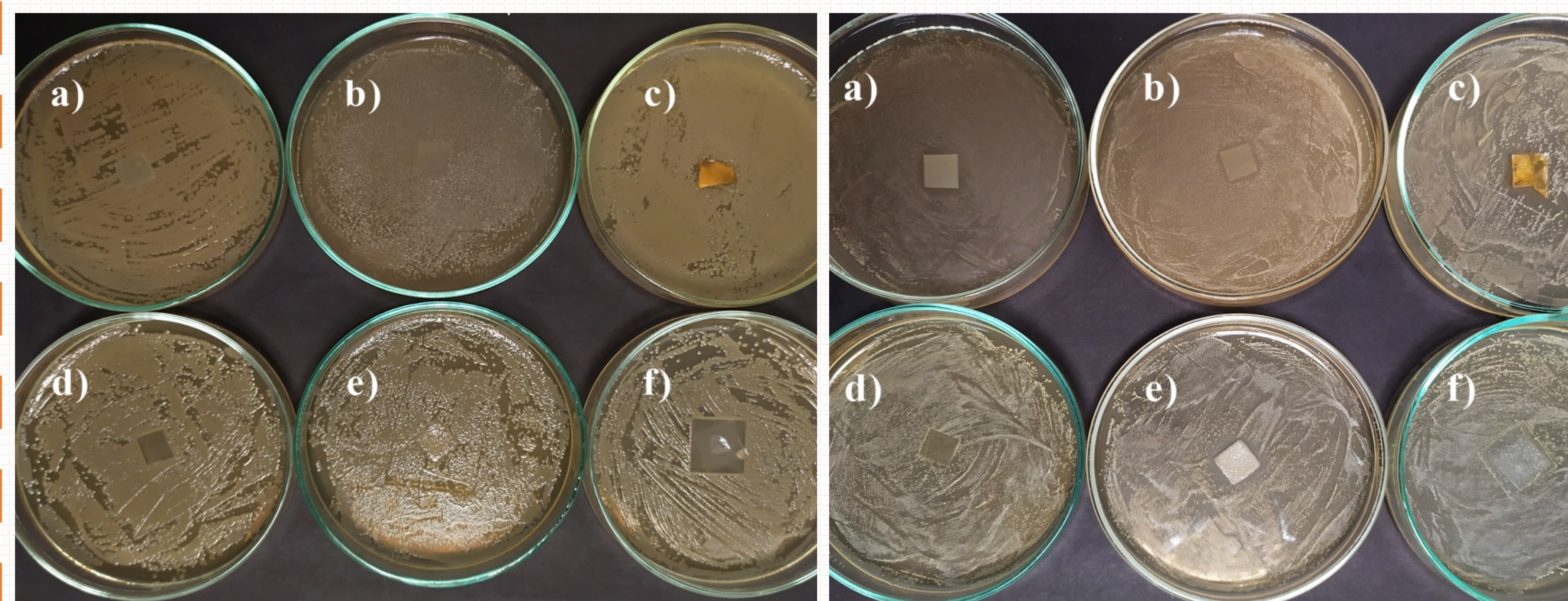
Two vanillin derivatives were tested in photocurable systems with 1 or 0.5 mol of 1,3-benzenedithiol or without it, using 3 mol.% of bis(2,4,6-trimethylbenzoyl)phosphine oxide as photoinitiator.

## RHEOLOGICAL CHARACTERISTICS OF RESINS



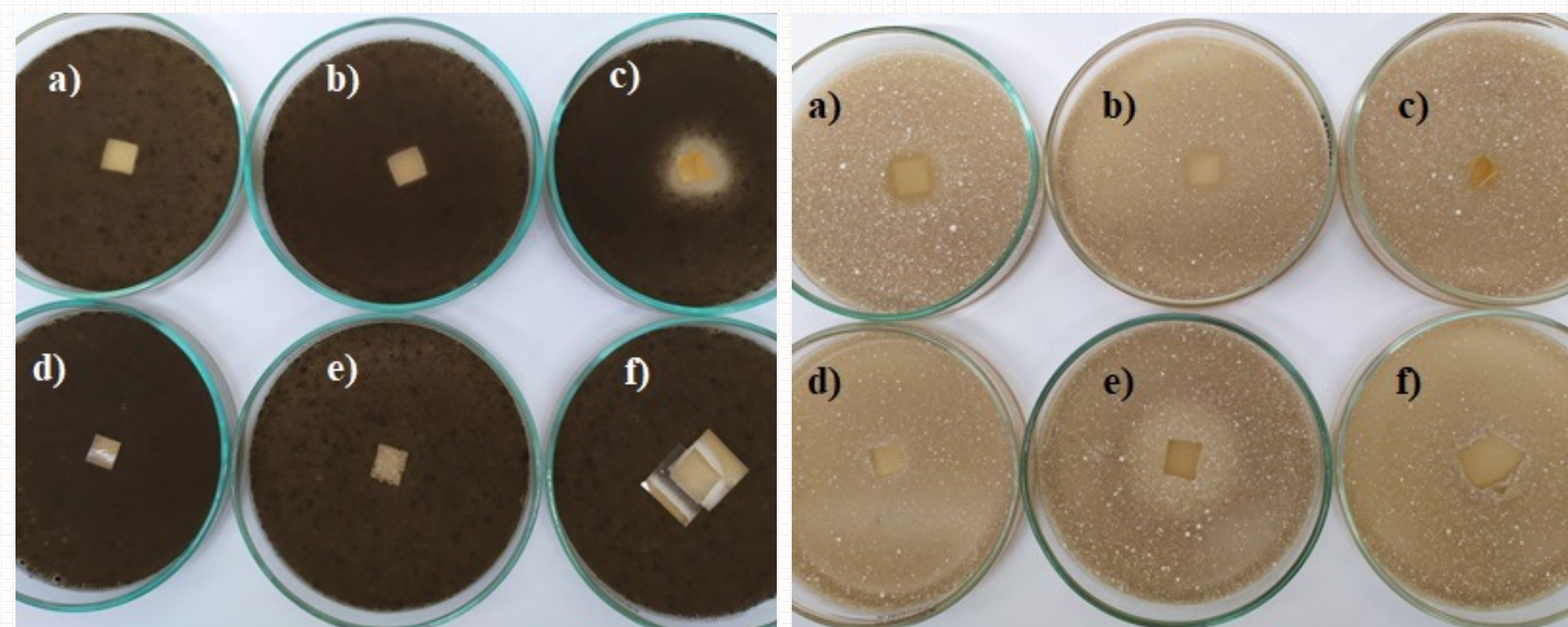
Dependencies of storage modulus  $G'$  of the VD and VDM-based resins, containing 3 mol.% of BAPO on irradiation time

## ANTIBACTERIAL ACTIVITY OF THE POLYMER FILMS



Toxicity testing of polymer film specimens for fungus *Escherichia coli* (left image) and *Staphylococcus aureus* (right image) on MHA medium: a)VD/1.3BDT/3BAPO, b)VD/1.3BDT/3BAPO/DCM, c)VD/3BAPO, d)VDM/1.3BDT/3BAPO/DCM, e)chitosan, f)hydroxyethyl starch

## ANTIFUNGAL ACTIVITY OF THE POLYMER FILMS



Toxicity testing of polymer film specimens for fungus *Aspergillus niger* (left image) and *Aspergillus terreus* (right image) on MEA medium: a)VD/1.3BDT/3BAPO, b)VD/1.3BDT/3BAPO/DCM, c)VD/3BAPO, d)VDM/1.3BDT/3BAPO/DCM, e)chitosan, f)hydroxyethyl starch

## CONCLUSIONS

- ❖ The curing time was the shortest when vanillin dimethacrylate or vanillin diacrylate and ethylphenyl(2,4,6-trimethylbenzoyl) phosphinate were used in the compositions without 1,3-benzenedithiol and dichloromethane.
- ❖ The most rigid polymers were obtained when vanillin dimethacrylate or vanillin diacrylate and ethylphenyl(2,4,6-trimethylbenzoyl) phosphinate were used in the compositions with 0.5 mol.% of 1,3-benzenedithiol.
- ❖ More rigid polymers were obtained when vanillin dimethacrylate was used instead of vanillin diacrylate.
- ❖ Addition of dichloromethane into the resins resulted in less rigid polymers and longer UV curing time.

## ACKNOWLEDGEMENT

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