VANILLIN ACRYLATE-BASED POLYMERS WITH ANTIBACTERIAL ACTIVITY

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Photopolymerization is the rapid formation of cross-linked polymers from monomers under the influence of the light. Photopolymerization can be initiated by UV-, visible- and rarely by IR-light [1]. In the last years vanillin and its derivatives are starting to be used in polymer synthesis as their aromatic resin provides high rigidity and thermal stability of resulting polymers [2].

This work focuses on the comparison of the influence of the resin composition on photocuring kinetics of free-radical, thiol-Michael, and dual curing systems as well as on antibacterial properties of resulted polymers. Two vanillin derivatives, vanillin dimethacrylate (VDM) and vanillin diacrylate (VD), were used in photocurable systems with 1 mol of 1,3-benzenedithiol (BDT) or without it, using phenyl bis(2,4,6-trimethylbenzoyl) phosphine oxide (BAPO) as photoinitiator. The small amount of dichloromethane (DCM) were used in some resins.

It was determined that all components have a significant influence on photocuring kinetics and properties of the resulting polymers. The addition of thiol increased the photocuring rate but reduced the rigidity of the resulting polymers. The addition of solvent slowed down the photocuring rate and less rigid polymers were obtained. Vanillin acrylate- and vanillin dimethacrylate-based polymers showed a significant antibacterial activity against *Escherichia coli* and *Staphylococcus aureus* in direct contact and on medium (Table 1).

Table 1. Antibacterial activity characteristics of polymer film specimens

Polymer film	Escherichia coli			Staphylococcus aureus		
	Growth Inhibition Zone, mm	Log Reduction after 24 h	Percent Reduction after 24 h	Growth Inhibition Zone, mm	Log Reduction after 24 h	Percent Reduction after 24 h
1VD/1BDT/3BAPO	0	0	100	2.1±0.8	0	100
1VD/1BDT/3BAPO/DCM	0	0	100	2.0±0.0	0	100
1VD/3BAPO	1.0±0.7	0	100	2.1±0.8	0	100
1VDM/1BDT/3BAPO/DCM	0	1.98	98.96	0	0	100
Chitosan	2.0±0.7	0	100	2.5±0.5	0	100
Hydroxyethyl starch	0	1.25	94.42	0	2.85	99.86

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References

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