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Structure-property Relation of a Soft Liner Material Used in Denture Applications

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Abstract:
With a view to understanding the structure-property relation of a silicone-based soft lining denture material after polymerization, its chemical composition and viscoelastic properties were investigated. Chemical compositions of the cured and uncured polymers of a commercial silicone permanent soft liner were determined by infrared spectroscopic analysis, nuclear magnetic resonance (NMR), and X-ray photoelectron spectroscopy. Dynamic mechanical analysis (DMA) method was used to investigate the viscoelastic behavior of the cured polymer of liner.
Spectroscopic analysis showed that the main component of soft liner was vinyl-terminated poly(dimethylsiloxane), and the adhesive was 3-methacryloxypropyltrimethoxy silane. NMR results revealed that other components included benzoyl peroxide as initiator for polymerization and also silicilic acid. Surface analysis by XPS provided interesting insights about the nature of adhesive bonding, as well as diffusion of silicilic acid through the matrix of the processed material and leaching-out. DMA results showed a two-phase character, and that the cured polymer was highly elastic.

Key words:
Liner, Chemical composition, Viscoelasticity

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