

## URETHANE BASED VINYL CYCLOPROPANES FOR LOW SHRINKAGE DENTAL COMPOSITES

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Composite materials, which are used for dental restorations for more than 50 years are gradually replacing amalgams. Such dental composites have led to a breakthrough in modern dentistry since they are easy to manipulate, inexpensive and have excellent esthetic properties. Their organic matrix is mainly based on monomers such as dimethacrylates and additives (e.g. initiators, stabilizers, pigments). Before curing the monomer molecules are located at van der Waals distance to each other, which changes during curing with the formation of covalent bonds. This causes a volumetric shrinkage of about 2.0 – 4.0 % during photocuring and has been a major challenge for research and industry.<sup>[1]</sup> The resulting shrinkage stress is supposed to generate microleakage, marginal staining, secondary caries and post-operative sensitivity.

Cyclic monomers like vinylcyclopropanes (VCPs) exhibit dramatically reduced shrinkage upon curing but so far, they have not found their place in restorative dentistry due to their low reactivity. Recently, it was found that Ivocerin<sup>®</sup>, was able to significantly increase the polymerization rate of these monomers.<sup>[2]</sup> Composites based on these new VCPs were shown to exhibit remarkably lower volumetric shrinkage and shrinkage stress than methacrylate-based materials and in addition the presence of the urethane group improved the mechanical properties.<sup>[3]</sup>

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