

## NANOTECHNOLOGY IN ADHESIVE RESTORATIVE BIOMATERIALS

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### Abstract

Adhesive restorative materials are tooth coloured materials that adhere to the enamel and dentin, either using the micro-mechanical retention or chemical bonding. Adhesion to tooth structure has obviated many of the disadvantages experienced with metallic materials providing better tooth-restorative margins, excellent aesthetics and ultra-conservation of tooth structure. Therefore, adhesive dentistry is considered as a vital breakthrough in restorative dentistry. If aesthetics and adhesions are their positive points, strength and wear resistance are their weak points. In order to meet up to the standards of ideal bio mimetic material, exhaustive attempts are being made in rendering them as effective bioactive materials, by adding antibacterial property and remineralizing capacity. Nano technology, a revolution in science at large has played a pivotal role in overcoming the negative aspects of the adhesive restorative materials. This paper highlights few of the avenues where nanotechnology has effectively influenced the way the adhesive restorative materials perform.

**Key words:** adhesive dentistry, nano technology, nano fillers, antibacterial activity, remineralizing capacity

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### Introduction:

Restorations are artificial replacement of the lost tooth structure due to disease; it should restore the form, function of the tooth structure and also restore the aesthetics and phonetics of the patient. Various metallic and non-metallic materials are used for this purpose of restoration.

Restorative-tooth junction is a biologically weak interface. Marginal degradation of the material results in micro leakage, percolation and microbial growth in the interface leading to secondary caries. Secondary caries is one of the major reason for restoration replacement.<sup>[1]</sup> This is more evident with the metallic restorative materials. These materials are retained in the tooth preparation with macro mechanical retention that also necessitates excessive removal of healthy tooth structure.

Though the metallic restorations are strong and last long, the patients' acceptance is less due to their un aesthetic appearance.

Adhesive restorative materials are tooth coloured materials that adhere to the enamel and dentin, either using the micro-mechanical retention or chemical bonding.<sup>[2]</sup> Adhesion to tooth structure has obviated many of the disadvantages experienced with metallic materials providing better tooth-restorative margins, excellent aesthetics and ultra-conservation of tooth structure. Therefore, adhesive dentistry is considered as a vital breakthrough in restorative dentistry.

Resin based composites and glass ionomer cements are two major class of tooth coloured adhesive restorative materials that are currently in use. While glass ionomer cement adheres to the tooth structure by chemical bonding, the composite resin restorative materials use acid etching of the tooth structure to adhere micro mechanically.<sup>[3,4]</sup>

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