

# Nanotechnology in Adhesive Dentistry

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**Background and Aim :** The concept of dentistry has been evolved with the adhesive restoration. Adhesives help reconstruct the lost structure of the teeth through unification with the dental structures at the interface. Since the structure of dental hard tissues is on a molecular scale by nature, unification with such tissue must also be performed on a nano-scale, rather than macro-mechanical retention. In this regard, dental adhesives should not only be nano-*fabricated*, but also need to be nano-*evaluated*. The aim of this paper is to identify some applications of the two field of nanotechnology, in the adhesive dentistry.

**Discussion and Conclusions:** Nano-fabrication refers to the technology used in production of dental adhesives. It involves the incorporation and surface treatment (silanization) of the sub-micron and nanofillers in the structure of the adhesive polymer. Moreover, molecular reactivity of the monomers with the mineral and organic dental substrate should be considered in the development of dental adhesives. On the other hand, nano-evaluation of the adhesive material and the bonding to tooth structure needs particular tools and techniques. Nano-leakage tests evaluate the permeability at the very interface (i.e. hybrid layer) between restorative composite and the dentin or enamel. Such evaluation is performed using various electron microscopic techniques. Mechanical properties of the adhesive resin polymer and the bond strength between tissue substance and the restoration are of vital importance. Bond strength tests have been developed on a micro-scale; however, nano-measurement of the physical nature of the bond is currently a theoretical concept. But nano-indentation techniques to evaluate mechanical properties of the polymer are being developed at the moment and have a great utility to predict the success of restorations.

**Innovation and Importance:** The success of dental restorations depends on development and understanding of the bonding interface on a nano-scale.

**Limitations:** Lack of knowledge and mutual relationship between basic sciences and dentistry maybe an obstacle to the development of dental nanotechnology.