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Recent Smart Dental Materials

Tamer M. Hamdy [1,*]

[1] Restorative and Dental Materials Department, Oral and Dental Research Institute, National Research Centre (NRC), Giza, Dokki, 12622, Egypt
* Corresponding author e-mail: dr_tamer_hamdy@yahoo.com

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Abstract: Smart materials have an integral competence to sense and react according to the variations in the environment. They can respond to the stimuli and changes in the surrounding environment by activating their functions accordingly and hence they are termed as" responsive materials". These materials have properties that can be altered in a measured way by stimuli such as stress, temperature, moisture, pH, electric, or magnetic fields. Several smart dental materials present recently in dental market such as smart resin composite, glass ionomer, pit and fissure sealants, endodontic instrument, orthodontic wires, silicone elastomer, bite registration material and thermochromic toothbrushes. These materials would potentially provide an innovative dental service with enhanced clinical outcome of the handling procedures.

Keywords: Smart, Biomimetic, bioresponsive, biosmart dentistry, materials.

Smart materials have an integral competence to sense and react according to the variations in the environment. They can respond to the stimuli and changes in the surrounding environment by activating their functions accordingly and hence they are termed as" responsive materials". These materials have properties that can be altered in a measured way by stimuli such as stress, temperature, moisture, pH, electric, or magnetic fields. Several smart dental materials present recently in dental market such as smart resin composite, glass ionomer, pit and fissure sealants, endodontic instrument, orthodontic wires, silicone elastomer, bite registration material and thermochromic toothbrushes.

These materials would potentially provide an innovative dental service with enhanced clinical outcome of the handling procedures.

Smart materials sense changes in the environment around them and responds in a predictable manner. In general, these features are:

Piezoelectric: when a mechanical stress is applied, an electric current is generated; Shape memory: can change the shape whenever required and can return back to original shape once force and pressure applied is removed; Thermo-chromic: these materials change color in response to changes in temperature; Photo-chromic: these materials change color in response to changes in light conditions; Magneto-rheological: these are fluid materials become solid when placed in a magnetic field; pH sensitive: when pH of the surroundings gets changed they will change their shape; Biofilm formation: presence of biofilm on the surface of material alters the interaction of the surface with the environment.

With developments in dental research, Novel dental materials have made their way into the dental market. Each newer restorative material introduced has its set of benefits and shortcomings. Restorative materials should be carefully chosen based on the clinical condition and requirements of the tooth to be restored. Clinician should have a thorough

understanding of the indications, contraindications, advantages and disadvantages of the dental material being used by them. This editorial provides a highlight to understand of the recent advancements and modifications in field of dental materials.