Smart Materials in Endodontics and Conservative dentistry

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Introduction

Smart materials have revolutionized many areas of dentistry. The quest for an ideal restorative material leads to the discovery of a newer generation of materials in conservative dentistry and endodontics called the smart materials.

Definition

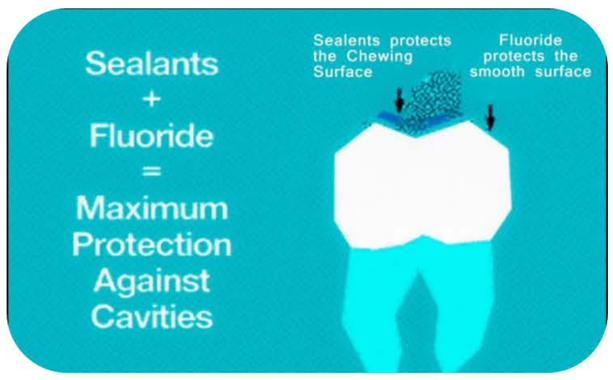
Smart materials have the properties which can be significantly altered in a controlled manner by external stimuli, such as stress, temperature, History moisture, pH, and electric or magnetic fields.

History

The first smart material application started with magnetostrictive technologies that involved the use of nickel as a sonar source during World War I to find German U-boats by allied forces.

Applications in conservative dentistry and endodontics :

Fluoride releasing pit and fissure sealant



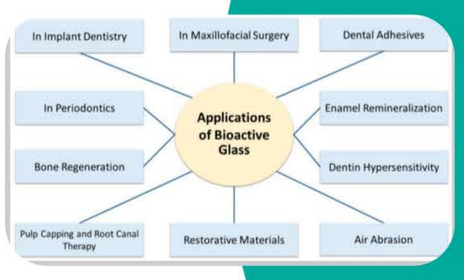
Smart Composites

Below critical pH
Ariston phc → releases → Fluoride, Calcium, Hydroxyl ions → supersaturation → Remineralization
neutralises pH

Smart Burs

- Removes only affected dentin layer in deep carious lesion
- Negative rake angle , breaks/abrades when contacting the hard dentin

BioActive Glass



CPP ACP

Buffers the pH of plaque by releasing Calcium and phosphate ions in the saliva making enamel more resilient thus preventing caries formation

C Point System

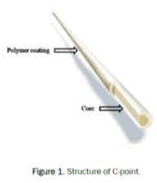
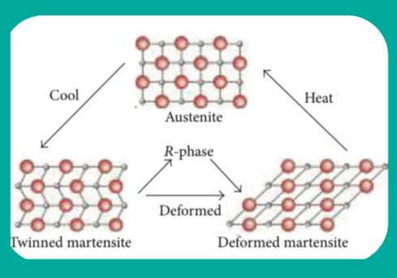


Figure 1. Structure of C-point.

Hydrophilic nature
Obturating points → Surrounding moisture → Fills void and spaces

Shape memory alloys



Smartpaste Bio

Resin based sealant designed to swell through the addition of ground polymer

Addition of ground polymer → Dimensional Stability

Conclusion

The numerous applications of smart materials have revolutionized the field of dentistry and there is no doubt that “smart materials” hold a real good promise for the future. So it’s time to think “smart” and apply bio-smart dentistry in our day-to-day clinical practice.

References

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