TABLE 1

Dental Product and Equipment Glossary: What You Need to Know

Term	Used For	Characteristics	Additional Information
Adhesion/Adhesives Often interchanged with "bond."	Facilitating bonds between two substrates; in many cases, unlike materials but can include like materials.	Adhesion of two substrates adds to the retention and leakage resistance at the interfaces.	An adhesive may be reported to have a low bond strength to a substrate due to a fracture, but the so-called "bond strength" could be a cohesive fracture within one of the materials being tested.
Bioactive Materials Refers to classes of products that are fluoride releasing (eg, glass ionomer cements, some resin-based materials) or used for pulp regeneration (eg, mineral trioxide aggregate materials, calcium silicate materials, or resin-modified calcium silicate cements).	Fluoride releasing: remineralizing enamel and dentin and inhibiting bacterial growth. Pulp regenerative materials: typically calcium hydroxide releasing, used for direct and indirect pulp capping to form reparative dentin and avoid endodontic therapy.	Fluoride releasing: typically used in non-stress bearing areas for teeth at moderate to high caries risk as a surface restorative or cement for an indirect restoration. Pulp regenerative materials: used as pulp capping liners and to treat root canal perforations, root resorption, and apexification of an immature root.	Bioactive has become a buzzword. You cannot generalize the final clinical result because a material is bioactive. Review the research to better understand the indications and clinical success with any class of material that is being advertised as bioactive.
Biomimetic Widely regarded as being synonymous with biomimicry, biomimesis, biognosis; similar to biologically inspired design.	The study of the structure and function of biologic systems as models for the design and engineering of materials and machines.	Displays a natural appearance. In restorative dentistry, refers to treatment of teeth with conservative, adhesive techniques to return tooth function to natural strength and resilience.	Like the similarly used terms minimally invasive and conservative, biomimetic does not have a formal or universally accepted dental definition.
Bond Strength Commonly used in the marketing of products to imply a tight and impervious attachment of a material to tooth structure.	Bonding to simulated vital human dentin usually exhibits lower bond strength than to enamel. Similarly, there are no measures of the durability of that bond over time, although most laboratory data suggest that it may diminish.	Clinical bond strengths are strongly dependent upon a multitude of factors apart from the chemistry of the bonding agent, including preparation and restoration design, manipulative variables, and patient habits.	Laboratory data showing high values implies a superior product and more enduring restoration. However, reported bond strengths are drawn from lab tests conducted on non-vital teeth in experiments that may not resemble clinical conditions. Clinicians should carefully evaluate claims by becoming familiar with testing procedures.
Bulk-Fill Refers to composite that can be placed in increments greater than 2 mm.	A technique for composite placement that is chemistry-specific; recommendations for use vary by manufacturer.	Although low-shrinkage composites have less volumetric shrinkage and shrinkage stress than conventional composites, the difference may be only 0.3% to 0.5%. The chemistry allows for more predictable deeper light curing.	Shrinkage stress may cause bonding gaps and microleakage. This property is difficult to assess because once composites are placed and cured, they absorb moisture and expand, thus reversing polymerization shrinkage.
Feldspathic Porcelains These highly translucent, esthetic restorations are fabricated with the traditional veneering porcelain powder and liquid brush build-up technique. Opaquer can be added by the laboratory when necessary to cover dark stain cases.	Feldspathic porcelains are traditionally used in veneer over metal and zirconia substructures. Allows for etching and bonding to enamel and/or dentin with composite resin if fabricated as a veneer, inlay/onlay, or crown to adequately resist fracture.	When bonded to the enamel of teeth (conservative preparation required), feldspathic porcelains exhibit acceptable compressive strengths and can last 20 to 25 years. However, feldspathic porcelain itself has low fracture strength (between 70 and 110 MPa).	A chamfer line is recommended with a 0.5-mm facial reduction finishing on the lingual incisal. The farther it extends beyond the bonded margin, the more likely a fracture or failure. Occlusion must be checked to minimize contact with unsupported porcelain.
Flowable Composites Low-viscosity composite resins that are usually extruded from a syringe equipped with a fine tip.	Bases, liners, sealants, bonding cements, low-stress esthetic restorations. Primary use is for preventive resin restorations.	Less filler than conventional composites. Easily placed and adapted to tooth surfaces via syringe. Produce relatively polishable, void-free surfaces.	Although they contain less filler than conventional composites, clinical studies are showing surprisingly good occlusal wear resistance.
Fluoride Releasing Refers to products that produce free fluoride ions that can be taken up by the tooth.	Used by product advocates to imply cariostatic and tooth remineralization benefits for dental patients. In some cases, clinical research justifies this assumption, but all therapy is dose-dependent with variable levels that may or not be therapeutic.	In many cases, therapeutic amounts of fluoride are "released" through dissolution and degradation of the restorative material. Dentists should be aware of this trade-off. Some fluoride-releasing materials can have the fluoride recharged with fluoride toothpastes and mouth rinses.	Fluoride containing does not mean fluoride release. Most composite resins with fluoride have non-therapeutic availability. There is little evidence that fluoride release from restorative materials can compensate for poorly placed restorations or sub-standard home care practices.
Generation (Bonding Agents) Groups of dentin- and/or enamel-bonding adhesives (each of the products within the group having similar chemistry and mode of use) that are introduced successively over time for the purpose of simplifying procedures and/or improving bond strength of resins to tooth structure.	Almost all generations of contemporary bonding agents are suitable for clinical use when properly applied.	4th Generation—Etch-and-rinse adhesives with separate bottles for primer and adhesive bonding resin. 5th Generation—Etch-and-rinse adhesives with one bottle containing both the primer and the bonding resin. 6th Generation—Type I: Self-etching with separate bottles of self-etch primer and adhesive. Type II: primer and adhesive are mixed before application to the tooth. 7th Generation—One bottle self-etch, no-mix adhesives allowing only one application. Dual-cured systems may require mixing of a catalyst.	Generation does not refer to improvement but is a term relative to a timeline. "Later" is not synonymous with "better." Later generation bonding agents may not be as universally useful or provide superior bond strengths compared to previous generations. Simplification of placement does not necessarily have a correlation to improvements in clinical outcomes.
Glass Ionomers A class of restorative cement that hardens by chemical reaction of glass powder and polyalkenoate liquid, is bioactive, and has fluoride release. Addition of resin (called resin-modified glass ionomers or resin ionomers) changes the chemistry for setting reaction (dual-cure, self setting with light-curing).	True glass ionomers require strict product-specific protocols for placement and are limited to low-stress esthetic restorations and bases.	Glass ionomers exhibit solubility, low to moderate abrasion resistance, and low tensile strength. Resin-modified glass ionomers have diminished fluoride release, a broader range of indications, superior physical properties and improved esthetics, fewer requirements for manipulation, and may be partially hardened by light curing.	Glass ionomers and resin-modified glass ionomers/resin ionomers are not interchangeable terms or materials. There is no standardization in the naming of resin-modified glass ionomers and resin ionomers. Resin ionomers typically have little fluoride release.
Leucite-Reinforced Ceramics Leucite crystals are added to a glass matrix. Used with a lost-wax process of pressing and also supplied in CAD/CAM blocks from which restorations may be milled.	Often used for high-strength porcelain veneers, single anterior crowns, and posterior inlays/onlays.	Like feldspathic porcelains, they are very translucent and highly esthetic, but have higher fracture resistance. Flexural strength is reported to be twice that of feldspathics (ie, 200 to 230 MPa). Typically used with surface characterization (can cause surface changes that affect appearance over time).	These initially required more tooth reduction, but now satisfactory restorations are produced with 0.5-mm tooth preparation. They must be bonded to the underlying tooth structure for best fracture resistance. For veneers, a chamfer margin is preferred. For crowns, a shoulder is also acceptable.
Lithium Disilicate Glass ceramic substructure with approximately 70% lithium disilicate crystals. The surface may be veneered with traditional feldspathic porcelains to provide a more esthetic appearance. Can be fabricated with a lost-wax process of pressing and also supplied in CAD/CAM blocks.	Because of their relatively high strength, these ceramics are used for anterior and posterior single crowns, inlays, and onlays where higher than average stress is expected.	Exhibit 2 to 3 times the flexural strength of the leucite-reinforced ceramics, with a reported average close to 400 MPa. Although somewhat translucent, they are seldom as esthetic as either leucite-reinforced or feldspathic restorations. Typically used with surface characterization (can cause surface changes that affect appearance over time).	Lithium disilicate is a "softer" ceramic, and it creates less wear with opposing natural dentition if it is not veneered with traditional feldspathic porcelain on the occlusal surfaces. This design is often the case when designing the lingual surface of maxillary anterior crowns or the occlusal surfaces of molar crowns.
Primer A confusing term because the chemistry of a primer depends on the substrate to which it is to be applied.	Primer for enamel and dentin	Dimethacrylate resin	The term "universal" suggests that a bonding agent can be used as a prime for multiple substrates; this is not always the case. It is critical to read the instructions for use to understand how to use a primer with different restorative materials.
	Primer for silica based ceramics	Silane	
	Primer for zirconia-based ceramics	Acidic adhesive monomer	
	Primer for plastic orthodontic bracket	Methyl methacrylate monomer	
	Primer for laboratory composite	Silane and methyl methacrylate monomer	
Resin Nano Ceramics A machinable block of restorative material composed of resin composite and some ceramic.	Full-coverage crowns, crowns over implants, inlays, onlays, and veneers.	Not a resin, composite, or pure ceramic, but a combination of all three and possessing a non-brittle and fracture-resistant nature.	Resin nano ceramic is being marketed as a new class of product. The extension of the term "ceramic" in the name implies this is porcelain when it is a composite with glass fillers (ceramic filler).
Universal Adhesives Adhesives for all indications.	The term "universal" means that the bonding agent can be used as a self-etching bonding agent or as an etch-and-rinse bonding agent with phosphoric acid.	Some universal bonding agents recommend the use of additional primers for some substrates, whereas others do not.	The term "universal" might suggest that the bonding agent can be used as a primer for multiple substrates. It is critical to read the instructions for use to understand how to use a primer with different materials and techniques.
Zirconia Ceramics Metal-free restoratives composed of yttria-tetragonal zirconia polycrystal (Y-TZP), in which polycrystals are used to fabricate the highest fracture-resistant frameworks.	Because of the high flexural strength (800 to 1500 MPa) and lack of cast metal, these are used for anterior 3 to 6 unit bridges, single anterior crowns in conjunction with anterior bridges, posterior crowns and bridges that require better esthetics than traditional PFM, and custom abutments for all-ceramic implant crowns in the esthetic zone. They are used in high stress bearing areas and in patients with allergies to metals.	The lack of glass within the matrix results in an opaque substructure, so even using a cut-back technique to veneer feldspathic porcelain may result in compromised esthetics. New formulations have improved translucency and are used in full-contour crowns. Studies have shown that high purity zirconia powder technology has reached a point of fabricating new biocompatible all-ceramic restorations with improved physical properties that offer a wide range of promising clinical applications.	These restorations are usually cemented rather than bonded. Some refer to these materials as metal-free, but zirconia is a white metal. Choice of an experienced laboratory or milling center choice goes a long way to achieving the best results. These materials are more opaque and may require surface characterization (can cause surface changes that affect appearance over time).