SDR™

Smart Dentin Replacement

SDR is a low viscosity base composite for posterior restorations used in an open sandwich technique (Fig. 1). It was developed to restore the dentin equivalent part of the restoration.

FEATURES

- **Smart Dentin Replacement (SDR)** in posterior teeth (open sandwich technique in class II)
- **flowable** consistency (self-leveling)
- **bulk fill** (4mm increments)
- **light cured** (20 seconds)
- **capped** with any universal or posterior composite
- **one universal** shade
- **compatible with conventional** adhesives

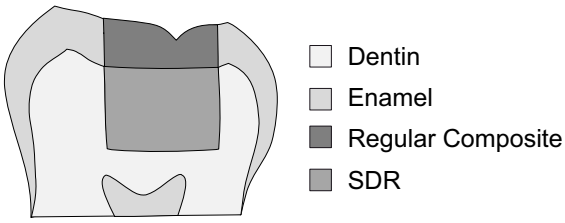

Fig. 1: Diagram depicting SDR optimal placement.

CHEMISTRY

With SDR Technology, a Polymerization Modulator was chemically embedded in the polymerizable resin backbone (Fig 2). Based on scientific evidence gathered to date, the Polymerization Modulator synergistically interacts with the camphorquinone photo-initiator so as to result in slower modulus development, allowing for stress reduction without a reduction in the polymerization rate or conversion. Essentially, the entire radical photo-polymerization process is mediated by the Polymerization Modulator specially built into the SDR resin which allows more linear/branching chain propagation without much cross-linking, and hence slower modulus development. This modulating effect allows extended polymerization without a sudden increase in cross-link density.Thus, the extended "Curing Phase" not only maximizes the overall degree of conversion, but also minimizes the polymerization stress resulting in the cured phase (Fig. 3 and 4).

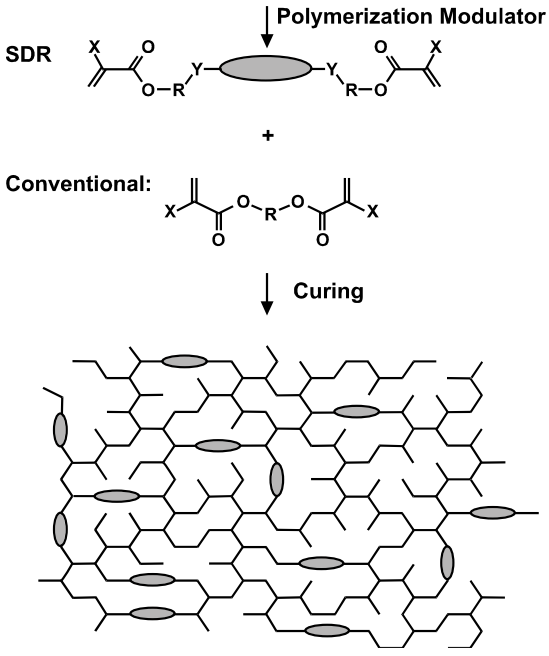

Fig. 2: Chemistry of SDR Technology. Note the inclusion of a "Polymerization Modulator" within the backbone of the SDR resin.

OPTIMIZED BALANCE OF PROPERTIES

SDR has an optimized balance of properties such as Shrinkage Stress, Flexural Modulus, Volume Shrinkage and Depth of Cure.

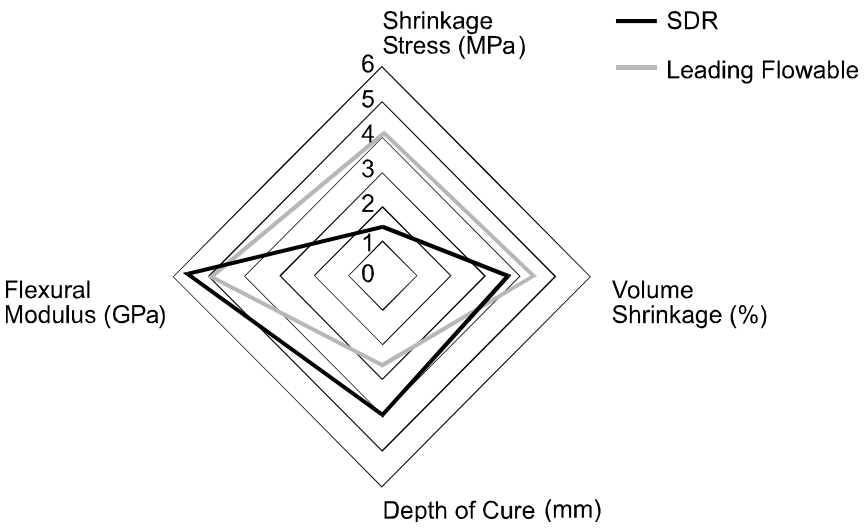

Fig. 3: Shrinkage Stress, Volume Shrinkage, Depth or Cure and Flexural Modulus of SDR in comparison to a leading flowable composite. Internal Data.

POLYMERIZATION STRESS (TENSIOMETER)

SDR imparts remarkably low polymerization stress when compared to other flowable and composites materials. The polymerization stress of various restorative materials as well as SDR is depicted in the figure below. Internal data.

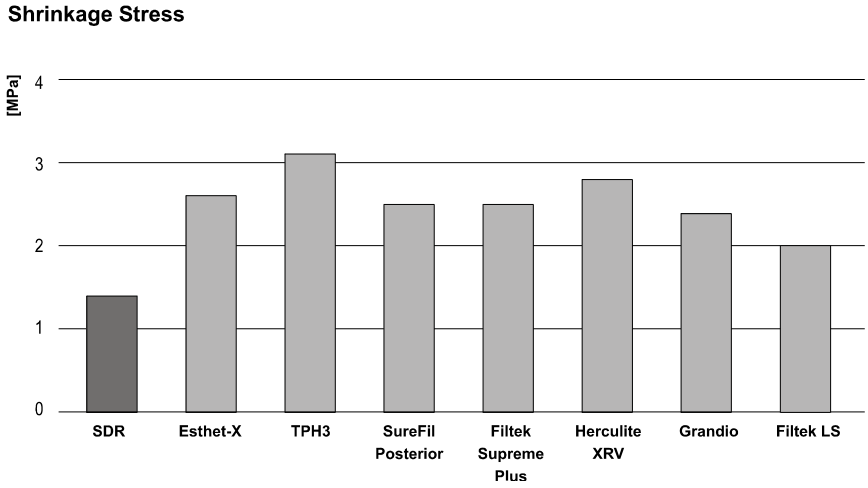

Fig. 4: Polymerization stress of various restorative materials. Measured in MPa with a tensiometer.

MARGINAL INTEGRITY

Roland Frankenberger, University of Marburg, Germany, investigated marginal integrity achieved with SDR in Class II restorations in conjunction with XP bond and Esthet-X HD as a caping material and compared it to Ceram-X Nano Ceramic Restorative also in conjunction with XP Bond. 2,500 thermo cycles and 100,000 chewing cycles were applied to the specimens. The results as percentage of perfect margins in Figure 5 indicate that the performance level of both restorative systems is equal.

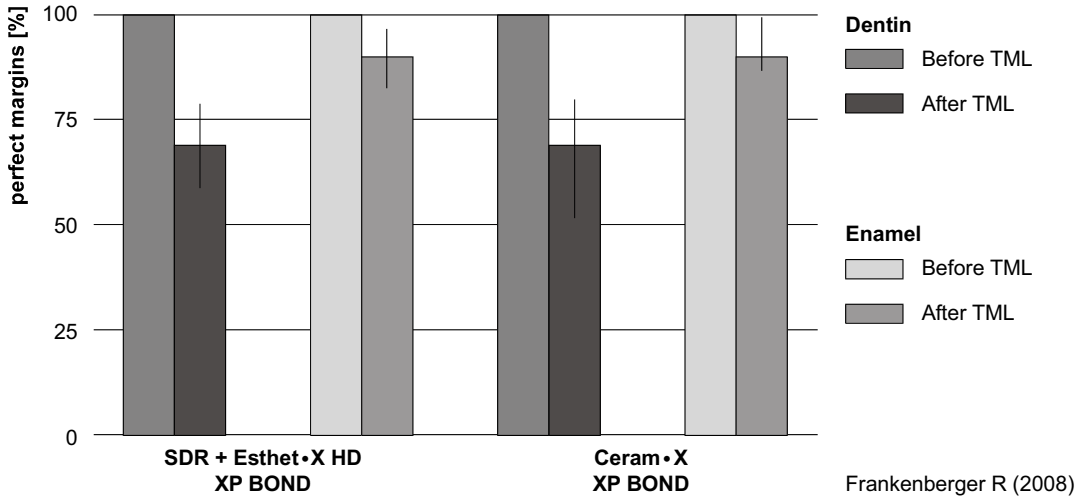

Fig 5: Marginal integrity before and after thermo-mechanical loading in dentin (D) and enamel (E).

CLINICAL TRIALS

A total of three clinical trials evaluated SDR performance on Class I and Class II restorations. These clinical trials were performed at two American Universities. A total of 153 restorations were evaluated at six months. Based upon the parameters evaluated in these trials, the low stress resin when used as a base in Class I and II restorations with a conventional universal composite resin as an occlusal capping agent exhibited acceptable performance with respect to safety and efficacy after six months. There were no failures associated with the experimental base material and no restorations lost at either site after six months. One restoration was replaced after six months, because of an air-bubble exposed within the capping composite material. Post-operative sensitivity following its use was 100% Alfa (no sensitivity) at one site and rated minimal at the second site (average of 1.11 at 6 months on a visual analogue scale from 0-10).