

Thanks to their low RDA values, toothpastes containing fine-grained diamond provide a better and safer means of dental cleaning than conventional toothpastes containing conventional abrasives such as ground silica, calcium phosphate and precipitated silica.

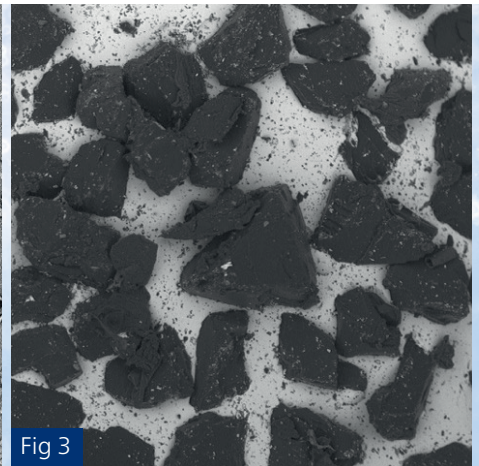
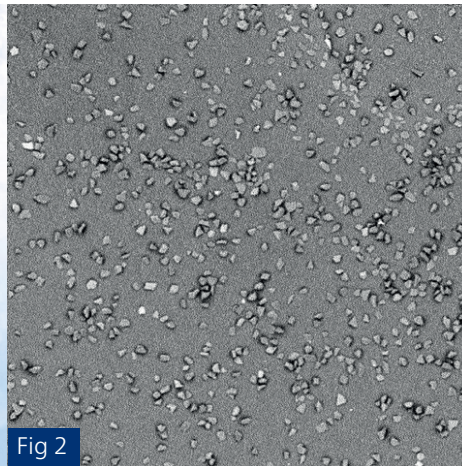
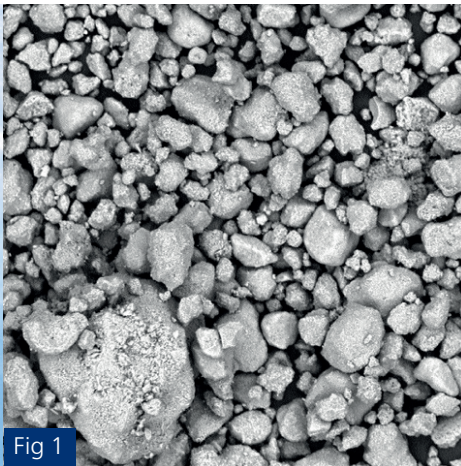
DIAMOND TOOTHPASTES – A NEW DEVELOPMENT IN DENTAL HYGIENE

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Diamond is the hardest known natural material. In light of its hardness, it is used for various industrial applications (milling, cutting, polishing, etc.). In smaller grain sizes, it is also used for polishing jewelry and the precision processing of optical and electronic components. The abrasive proper-

ties of diamond approach zero as its grain sizes decreases. The capacity of a substance to have an abrasive effect on enamel is measured in REA. The same effect on dentin is measured in RDA. The RDA values of conventional toothpastes range from a mild 30 to a highly abrasive 200 (too abrasive for

daily use) depending on their indication (e.g. for removing tobacco stains or plaque from sensitive teeth). The grain size of conventional abrasives typically ranges from 1 to 100 µm, with some exceptional cases as large as 150 µm.



Figures 1 and 2: Equal-magnification comparison of conventional abrasives and diamond powder at a grain size 3 µm
Figure 3: Fine-grained diamond (red) as it is used in dental shaping (equal magnification)

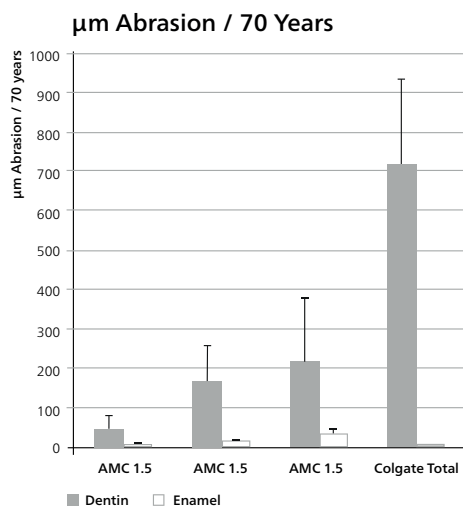


Fig 4

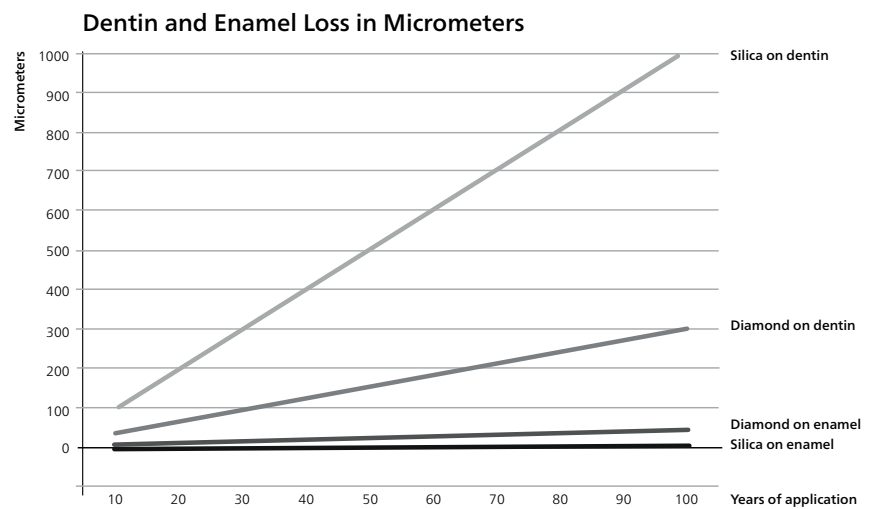


Fig 5

Figure 4: Dentin and enamel loss caused by diamond at grain sizes 1.5 µm, 2.5 µm and 4 µm compared to the loss caused by the abrasives in the biggest selling toothpastes on the market, as measured via profilometry (Attin T., University of Zurich 2014)

Figure 5: Dentin and enamel loss (in micrometers) over the course of 100 years

Given that many conventional abrasives tend to be softer than enamel, but harder than dentin, they have a cleaning and only mildly abrasive effect on enamel surfaces and an overly abrasive and destructive effect on dentin and cementum, especially on account of their larger grain size. They are ultimately responsible for the common wedge-shaped loss of tooth substance in the neck of the teeth and various sensitivity disorders. The concentration (percent by weight) of abrasives in conventional toothpastes is usually between 10% and 30%. One particular advantage of bio-inert diamond powder is that its grain size and concentration can be easily adjusted in the context of toothpaste production. Although diamond

is harder than enamel, it does not have an overly abrasive effect at a grain size of 2 to 3 µm. On the contrary, it enables thorough cleaning without destroying enamel and dentin. The diamond concentration in diamond powder toothpaste is also minimal when compared to the concentration of abrasives in conventional toothpastes. At around 20 µm for every 70 years of use, the abrasive effect of diamond powder toothpaste on enamel is negligible. Moreover, its abrasive effect on dentin is 70% to 90% less than that of conventional toothpastes whose impact can measure as high as 700 µm for every 70 years of use. The advantages of diamond powder toothpaste include the preservation of a smooth enamel

surface, reduced hypersensitivity and the prevention of dental defects, even in the face of vigorous brushing. The polishing effects also prevent tartar and plaque formation and help to brighten the teeth. Diamond powder is bio-inert, meaning that it will not react with other substances in toothpaste. The advantages have been demonstrated in clinical studies carried out at universities in the United States and Europe, and the new toothpaste has been patented around the world. Finally, given that diamond powder does not need to be added to toothpaste at concentrations as high as the abrasives in conventional toothpastes, its use as an abrasive is altogether consumer friendly in terms of its price.

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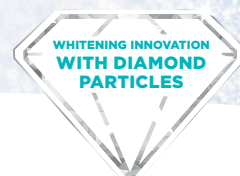
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- Particularly suitable for sensitive teeth.
- Helps protect and strengthen tooth enamel thanks to its fluoride-enriched formula which prevents cavities.

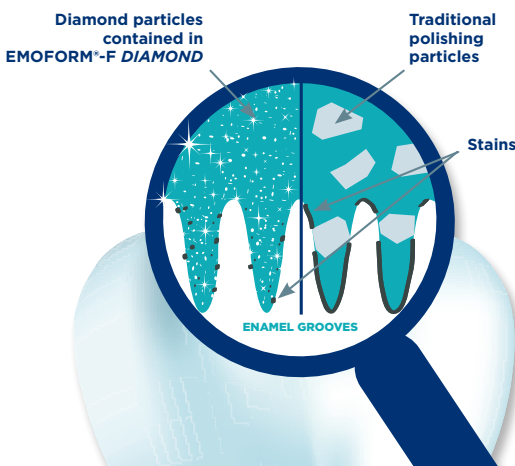
AN EXCLUSIVE FORMULA WITH DIAMOND PARTICLES suitable for sensitive teeth

- Contains diamond particles at least 100 times finer than the abrasive components used in most bleaching solutions.
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