Interview with Dr. Joachim Zech, Head of Research & Development of Dental Impression Materials, 3M Oral Care, Seefeld, Germany

About the development of the first super quick polyether

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With the complexity of an indirect restorative procedure, the requirements concerning impression accuracy tend to increase. An error in an impression used to produce a crown may lead to a poor fit, but manual adjustments are usually sufficient to produce a satisfactory result. If a similar error occurs in an impression involving multiple prepared teeth or implants, a remake of the prosthetic work is often necessary.

Does that mean that it is sufficient to use a less accurate impression material for small cases? It does not, as optimizing impression quality means minimizing the risk that impressions need to be retaken and prosthetic work needs to be adjusted. This, in turn, will save valuable time and lead to a more efficient and economic treatment procedure.

For this reason, many dentists rely on 3M™ Impregum™ Polyether Impression Materials even for their small cases. So far, however, they had to accept a drawback – the comparably long setting time of polyether materials. It slowed down polymer users in comparison to those using fast-setting VPS materials and reduced the potential time savings. This is no longer the case – due to the launch of 3M™ Impregum™ Super Quick Polyether Impression Material that is currently available in two viscosities (medium and light body). We talked about the development of this innovation with Dr. Joachim Zech, Head of the R&D Team for Impression Materials at 3M in Seefeld, Germany.

Dr. Zech, why did you decide to develop a new superfast polyether impression material?

The main aims of the project was developed based on market research and user feedback. This gave us the insight that the general interest in conventional impression materials is still high – despite the availability and evolution of high performance intraoral scanners. In addition, we found that polymer materials are generally very happy with the existing polyether properties, especially the great flow behaviour and reliable performance in the presence of moisture. At the same time, we identified a growing demand for a material that offers these benefits combined with a setting time ideal for small cases. This may be related to the fact that the number of single tooth restorations placed increases continuously and dentists simply want to obtain the best possible results in the shortest possible time.

How did you manage to reduce the setting time?

The reduction of the setting time was challenging, as we needed to develop a new initiator compound.

It is always possible to adjust the setting times to a certain extent without fundamental changes, but we had exhausted this potential for the existing initiator. Thus, there was no other way to reach our goal than by altering the basic chemistry. We were able to successfully accomplish this task within a reasonable time span thanks to the possibility of collaborating closely with our skilled colleagues from the chemical synthesis plant and from production in Seefeld. In this way, we were able to streamline the complete process from raw material development to production.

You said that the basic chemistry was altered. Is 3M™ Impregum™ Super Quick Polyether Impression Material still a true polyether?

Yes, the new material is a true polyether. The new base paste also contains the aziridino-polyether – the beating heart of every polyether impression material. Hence, the reactive groups and the curing mechanism in this paste are still the same. In addition, the newly developed initiator compound is made of a molecule that is similar to the existing one. The small, but decisive difference lies in the substituents, which are larger and exhibit a higher reactivity. The result is a faster setting reaction and – as a beneficial side effect – a more neutral taste of the impression material. Exchanging the initiator also required us to exchange or add a few other components mainly in the catalyst pastes, including plasticizers and pigments.

How is a high product quality ensured?

Extensive testing of the basic raw materials and the pastes in the development phase was carried out to ensure that the proven polyether properties are still offered. The raw materials undergo comprehensive chemical-physical analysis and physical-mechanical tests are usually used for characterization of the pastes. In the first step, the test results are used to identify the most promising formulations and to adjust and fine-tune the components for final product development. Later, they are needed to ensure that the internal quality standards are met, while some of the tests are needed, e.g. for FDA approval and CE certification of the final product. As a matter of course, every batch of polyether impression material produced in Seefeld is subjected to strict quality controls.

Is the high product quality the main argument for dentists to test the new material?

It is the well-balanced and proven material properties combined with the short setting reaction that make the material worth testing in the practice environment. Many dental practitioners prefer polyether impression materials, especially when intraoral moisture control is difficult. For those who are not familiar with the typical intrinsic hydrophilicity of polyethers and the clinical behaviour related to this feature, it might be a perfect occasion to find out more about it now. For existing Impregum users, it might be interesting to start using a true polyether for their small cases as well – or to increase their productivity by replacing a slower setting polyether in this situation. Many of those who have already tested the innovative addition to the Impregum family are enthusiastic about it and would recommend it to their colleagues**.

*Source: 3M field evaluation with 447 participants from Europe and the US, 2017.

To learn more about 3M™ Impregum™ Polyether Impression Materials please visit www.3M.co.uk (for European countries), www.3M.com.sa (Saudi Arabia) or contact us at 3MOralCareGulf@mmm.com.

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