

Pioneering medical technology

Surgical suction handle made of CYROLITE® improves the treatment of bone defects

- **TissueFlow, a medical start-up, develops the BoneFlo®+ operation instrument for pioneering methods in bone surgery**
- **Röhm offers a proven material for innovative medical technology under the brand CYROLITE®**
- **CYROLITE® material offers high transparency, gamma stability and precision during injection molding**

Doctors now hold the key to recovery in their hands: The TissueFlow start-up has developed an innovative instrument for orthopedic surgery, which promotes the self-healing of injured bones. The surgical suction handle is made of CYROLITE® from Röhm – a high-quality transparent plastic for use in medical technology.

Collecting the body's own cells for the healing process

A bone injury often results in a complicated operation and a long healing process. When such an operation begins, it is sometimes not apparent how extensive the damage to bones and joints really is. Such operations rely on constant suctioning of blood and tissue components to provide the surgeon with a best possible outcome. The suction-extracted organic mixture of blood, fatty tissue and fragments of bone marrow is usually discarded. A series of studies conducted by TissueFlow at the University of Duisburg-Essen has shown that this mixture can also be used to aid the bone healing process.

Using their findings, the founders of TissueFlow and medical experts at the University of Duisburg-Essen developed a new procedure for treating bone defects and obtained a patent for the surgical instrument they developed under the official product name, BoneFlo®+. BoneFlo®+ is a surgical suction handle that can be filled with bone substitute material as needed, and the the suction flow saturates the material with the body's own tissue particles and stem cells. Subsequently, the surgeon can precisely model the enriched bone substitute material to repair the damaged bones. "This supports the body's self-healing power," says Dr. Marcel Haversath, one of the founders of TissueFlow.

CYROLITE®: a proven material for pioneering medical technology

Dr. Marcel Haversath, Dr. André Busch, Prof. Dr. Marcus Jäger and Maximilian Tersteegen founded TissueFlow in 2019 with the goal of developing medical products by surgeons for surgeons. When producing the suction handle, the medical specialists called upon experts from the plastics processing industry: Roth Plastic Technology designed the handle prototypes and Oschmann Kunststofftechnik manufactured the parts using the CYROLITE® GS-90 molding compound from Röhm.

CYROLITE® products are acrylic-based copolymers used in various disposable medical devices from filter housings, to blood storage and processing components, to infusion therapy and catheter accessories, to surgical suction equipment such as BoneFlo® and BoneFlo®+.

"We are delighted that our proven material for medical technology is supporting this promising procedure in bone surgery," states Dirk Heyl, Technical Marketing Manager

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Medical at Röhm's Molding Compounds business unit. And Sebastian Herrmann, General Manager at Roth Plastic Technology, adds: "The decisive criteria in selecting CYROLITE® for this application are its exceptional transparency, its suitability for gamma sterilization, its high degree of biocompatibility as well as its chemical resistance to blood, tissue fluids and lipids. Chemical resistance is a key requirement considering that the handle's material comes into direct contact with these bodily fluids."

Getting a handle on bone surgery

The basic version of BoneFlo® works like a conventional suction device and consists of five injection-molded components made of CYROLITE®: a screw-on handle, which also serves as a filter housing, as well as two filters and two interchangeable suction tips. The perforated, tube-shaped plastic filter prevents the hose from being clogged by tissue, which in turn would interrupt the suctioning process. At the same time, the design allows the body's own tissue material to be collected as needed.

In addition to the two CYROLITE® filters, the innovative advanced version BoneFlo®+ also contains an identically shaped insert made of the bone substitute material β -Tricalcium phosphate (β -TCP), which can be substituted as needed. "Bone progenitor cells in blood and tissue particles have the potential to stimulate new bone growth. But this requires a substrate to which they can bond. This is where the filter made of porous β -TCP comes in. During suction, the material is essentially saturated by the body's own nutrient solution, which matches the tissue conditions on the injured bone," explains Dr. Haversath. "Therefore, the suction handle has to be transparent so that we can see when the bone substitute material is sufficiently wetted and can be removed."

Material ensures excellent feel and handling

The modular design of BoneFlo®+ makes it possible for the surgeon to decide during the surgical procedure whether the bone substitute material is needed. If it is required, the surgeon can replace the plastic filter made of CYROLITE® with the β -TCP insert – and vice versa. BoneFlo® and BoneFlo®+ are designed in such a way that the housing can easily be unscrewed for a quick and safe filter change during an operation. "For the thread of the screw cap in particular, the very highest precision is required during injection molding. This is achieved thanks to the special flow capability and dimensional stability of the CYROLITE® GS-90 molding compound" explains Edmund Oschmann, CEO of Oschmann Kunststofftechnik.

Moreover, the grooved handle allows for stable and slip-proof handling. "Surgical instruments must be non-slipping, shockproof and robust," Dr. Haversath states, specifying three additional material requirements fulfilled by the impact-resistant and biocompatible material from Röhm.

Runner-up at the German Medical Award 2020

According to TissueFlow, BoneFlo®+ is the first suction handle that allows the combination of synthetic bone substitute material with the body's own tissue. The development of BoneFlo® was supported by the state of North Rhine-Westphalia and the European Union. TissueFlow achieved professional recognition for its innovative suction handle by achieving second place at the German Medical Award 2020, which honors outstanding performance and innovation in medicine.

According to the founders, the approval process is nearly completed and they expect the initial commercial production of the basic BoneFlo® version with plastic filters to start during the course of 2021. The production of BoneFlo®+ with the insert made of β -TCP will follow in 2022. Additional product variants are already planned and will also be manufactured using CYROLITE® from Röhm.



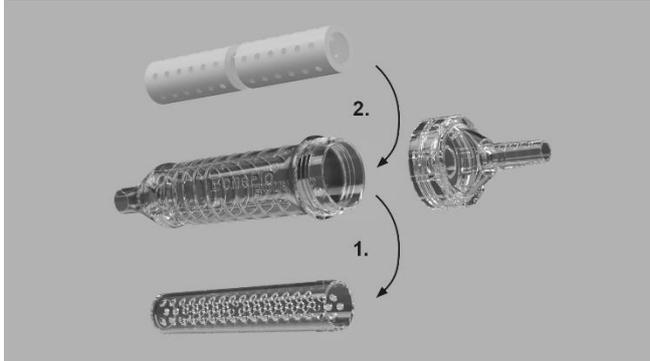
BoneFlo®, the surgical suction handle from TissueFlow, is made of CYROLITE® GS-90 from Röhm.

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The patented BoneFlo®+ surgical handle consists of five injection-molded components made of CYROLITE®: a screw-on handle, which also serves as a filter housing, as well as two filters and two interchangeable suction tips. The synthetic bone substitute is available separately and can be used depending on requirements during an operation.

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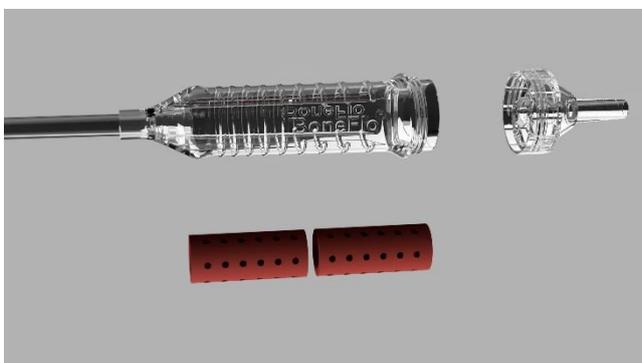
Thanks to its excellent flow capability and dimensional stability, CYROLITE® GS-90 ensures the highest level of precision during injection molding. The handle's thread is easy to unscrew when changing filters.

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The insert made of β -Tricalcium phosphate is saturated with the body's own tissue during suction, which in turn promotes the healing of the bone substitute material. CYROLITE® is biocompatible and is highly resistant to lipids and other tissue material.

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Transparency is key here: TissueFlow selected the highly transparent CYROLITE® GS-90 material so that it is easy to see when the bone substitute material is thoroughly saturated and can be removed.

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About Röhm

With 3,500 employees and 15 production sites worldwide, Röhm is one of the leading manufacturers in the methacrylate business. The medium-sized company with branches in Germany, China, the USA, Russia, and South Africa has more than 80 years of experience in methacrylate chemistry and a strong technology platform. Our best-known brands include PLEXIGLAS®, ACRYLITE®, MERACRYL™, DEGALAN®, DEGAROUTE® and CYROLITE®.

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