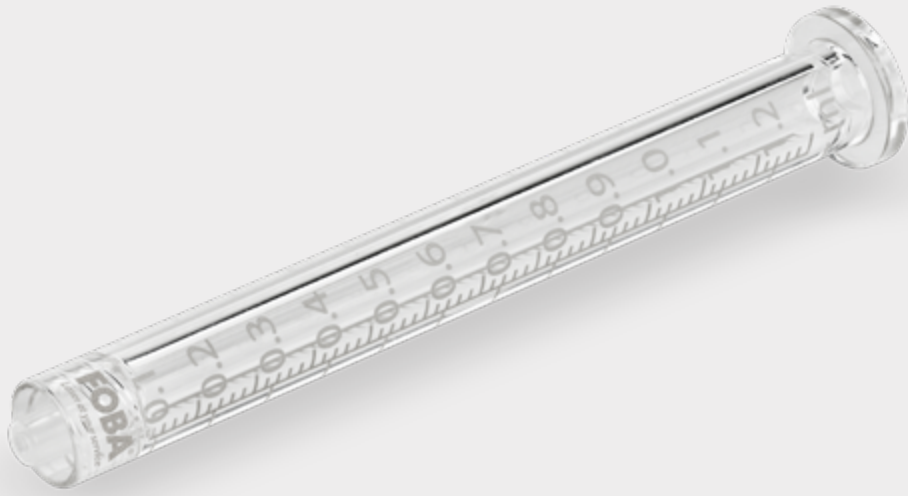


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# TRANSPARENT POLYMERS

## NON-DESTRUCTIVE LASER MARKING OF COC AND COP

How can demanding medical-grade plastics  
be marked safely and reliably?



COP, laser marked with FOBA's ultrashort pulse laser F.0100-ir.

## BACKGROUND

Highly transparent polymers such as COP (Cyclo-Olefin Polymer) and COC (Cyclo-Olefin Copolymer) are gaining importance in medical technology due to their unique material properties.

Permanent and safe laser marking of these materials is possible but it requires expertise, the perfect-fit laser technology, and precise adaptation to the material-specific characteristics.

## THE CHALLENGE

Compared to conventional plastics, COP and COC exhibit significantly higher UV transmission (COC: up to 230 nm), making them as transparent as glass. In **medical applications**, they are increasingly used as alternatives to borosilicate glass, for example in prefilled syringes that require **precise scale** and **dosage markings**.

To meet the **stringent requirements** of medical applications, markings must be **permanently legible without compromising the surface**.

**Ink-based marking methods** often struggle to adhere reliably to COP and COC: Achieving reliable adhesion generally requires **surface pretreatment**,

resulting in a more complicated, expensive, and inefficient workflow. Moreover, such methods may affect sterility or material integrity.

Considering these factors, **laser marking** proves to be the optimal solution. However, the unique characteristics that make COP and COC so valuable for medical technology, also restrict their responsiveness to many laser wavelengths. Additionally, **preserving material integrity** during laser marking requires a **process with virtually no thermal impact**.

# THE SOLUTION

Ultrashort pulse lasers are ideally suited for **non-destructive yet high-contrast marking**. Extremely short pulse durations in the femto- and picosecond range produce high peak pulse power, enabling nonlinear interactions with the material. This so-called „**cold marking**“ process creates pin-sharp markings without thermal stress.

Nevertheless, even ultrashort pulse lasers are challenged by the **specific characteristics** of COP and COC. A **high-quality, reliable marking result** can only be achieved when **pulse width** and **repetition rate** are precisely adjusted to the material.

With its **continuously adjustable pulse width**, FOBA's F.0100-ir provides the flexibility needed to **overcome this challenge**. This feature is the key to safe, additive-free marking of these demanding materials as it allows **optimal parameter adjustment**. The result is a **permanent, scratch-resistant, high-resolution marking**. Even the finest structures can be realized on small surfaces.



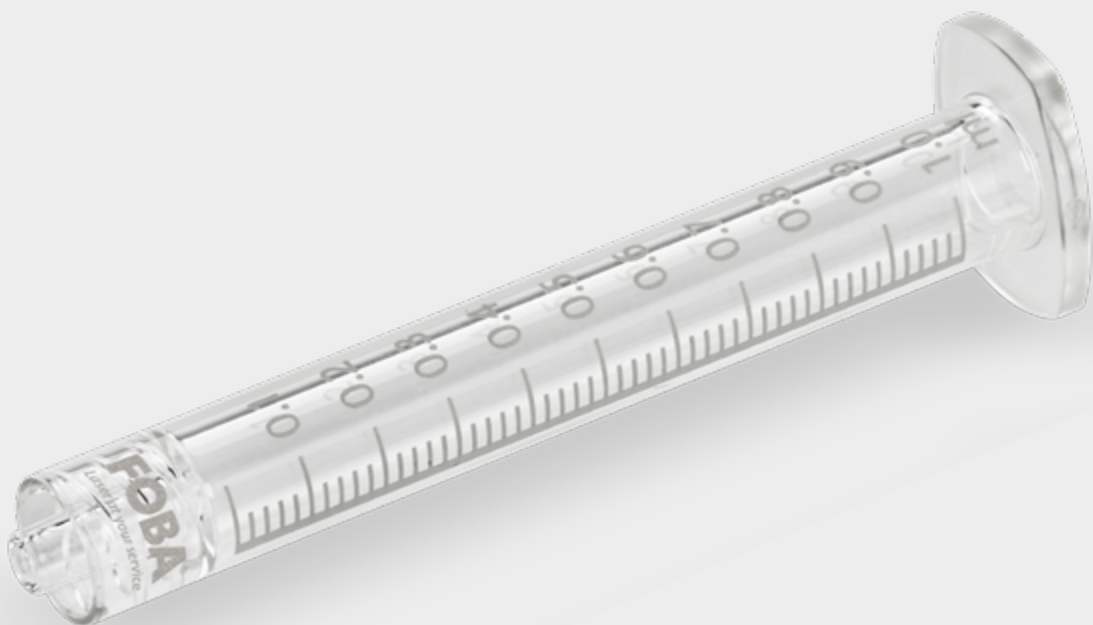
*Ultrashort pulse laser FOBA F.0100-ir.*

# CONCLUSION

For high-contrast, material-friendly marking of COP and COC, FOBA's F.0100-ir ultrashort pulse laser is the ideal solution.

With **technical precision** and **flexibility**, it ensures safe marking in line with the **standards of the medical and pharmaceutical industries**. The automated, vision- and software-controlled marking process delivers **maximum efficiency** and **process reliability**, even at high marking speeds.

*COC, laser marked with FOBA's ultrashort pulse laser F.0100-ir.*



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## ABOUT FOBA

For five decades, we have been writing with light, developing and manufacturing leading laser marking solutions for direct part and product marking. With our internationally proven laser and application know-how and industry-tested marking lasers and laser marking workstations, we reliably and economically make our mark on countless products in all industries. Integrated imaging, innovative software functions and comprehensive services as well as globally competent consulting and first-class customer service nicely complete our portfolio.

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Laser class 4

