

Method for Crystal Periodic Poling Quality Evaluation



Vilnius
University

SUMMARY

The proposed method allows to evaluate the quality of a periodically poled crystal (PPC), by employing nonlinear phenomena in the crystal.

BACKGROUND

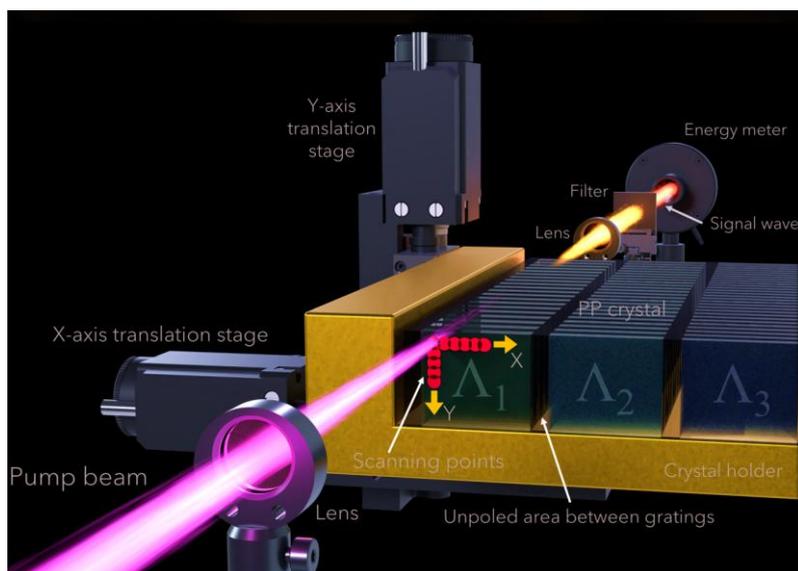
PPCs are gaining attention as a valuable nonlinear media in laser technologies, telecommunication or quantum technologies, defense sector, biomedical imaging and other scientific research. The rising usage of such crystals is inevitably linked to the quality assurance PPC. Since the process of crystal poling is complicated and non-trivial, it is important to check for poling defects to ensure maximum operating efficiency of devices using PPCs.

TECHNOLOGY

The presented method is a PPC quality evaluation system. The working principle of the method is based on nonlinear optical phenomena, occurring inside the PPC. A laser beam is focused in the center of the crystal volume – as a result, a measurable nonlinear signal is generated and detected by a power. The registered generated signal power is used to calculate and estimate the PPC poling quality.

The quality measurement is automated and is controlled through a dedicated software. The laser beam is focused on different points of the examined crystal, and as a result, a 2D map of the generated nonlinear signal power is created, which corresponds to the poling quality of the PPC. The measurement process is non-destructive, thus the evaluated crystal can be used in further research or commercial use.

The maximum dimensions of the measured PPC are 10 mm by 50 mm by 2 mm (W x L x H).



TECHNOLOGY READINESS

TRL 5 – the technology has been validated in a relevant laboratory environment.

INVENTORS

- Julius Vengelis
- Jonas Banyš
- Jokūbas Pimpė

BENEFITS

- Non-invasive method;
- Possibility to scan the whole crystal volume;
- High spatial resolution;
- Short measurement time;
- Wide spectral range of the power sensor operation;
- Possibility to heat the PPC.

APPLICATION

The presented technology can be used to determine the periodically poled crystal poling quality.

CONTACTS

Dr. Julius Vengelis
Ultrafast nonlinear optics group
Laser Research Center
Vilnius University
E-mail: julius.vengelis@ff.vu.lt
Phone: +370 623 47 017

Elena Osteikaitė
Innovation Office
Vilnius University
E-mail: elena.osteikaite@ff.vu.lt
Phone No.: +370 5 236 6296