In Ogliastra since 1997

SCIMEX
1. Opto Materials S.r.l.
2. Scimex Medical Laser Systems
3. FILAR (Fabbrica Italiana Lenti Arbatax)

Since November 2014 group collapsed into a single company

FILAR – Opto Materials

FOM: Location & Address

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Main Products

Synthetic Optical & Laser Crystals

Garnets: Nd:YAG, Er:YAG, Ho:YAG, CTH:YAG, Ce,Nd:YAG, Yb:YAG, Cr:YAG, …

Mixed Garnet Crystals: Nd:GSAG, Nd:YSGG, …

Alexandrite Crystals

Rods & slabs
Scintillating Crystals
Crystals, pixels and discs

YAP, LuYAP, LuAP, CsI

Applications:
- medical imaging
- industrial applications
- high energy physics
- security scanning
- scientific research

L(Y)SO, LSO, Ce:YAG

Main Products

Solid-state laser components
Laser rods & Slabs: Nd:YAG, Er:YAG, Alexandrite, Ruby, Ho:YAG, CTH:YAG, ...

Samarium glass & Ceramic laser cavities, filters & Flow Tubes
Main Products

Laser optics and custom optics
Lenses, mirrors, windows, filters, polarizers, ...

Medical Lasers

Fiber Lasers

Ophthalmic Optics

Optical Coating Services
(AR, HR, OC, and custom)

Refurbishing of laser crystal rods and optics

Fiber lasers from FILAR - Opto Materials

PULSED FIBER LASER
Modello: 1550-PFL-1

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Wavelength</td>
<td>1550 nm</td>
</tr>
<tr>
<td>Pulse width</td>
<td>1 ns FWHM (*)</td>
</tr>
<tr>
<td>Pulse repetition frequency</td>
<td>0.1-50 Hz in steps of 0.1 Hz (**)</td>
</tr>
<tr>
<td>Peak power</td>
<td>500 W (**)</td>
</tr>
<tr>
<td>Output fiber</td>
<td>Single mode SMF28</td>
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</tbody>
</table>
Capability

The Facility

Total area: ~15000sqm
(2 buildings~3000sqm)

Crystal-growth pullers
(up to 2400 °C)

Chemical labs & clean rooms

Opto-mechanical labs
(cutting, drilling, polishing, marking, …)

Ophthalmic optics facility

Vacuum coating plants

Quality Control / R&D labs
(interferometer, spectrophotometer, lasers, radiometer, radioactive source…)

Certifications

UNI EN ISO 9001 – 2008
UNI EN ISO 14001-2004

Capability: Production Facility

Opto-mechanical labs: cutting, ultrasonic drilling & laser marking, shaping, lapping, surface polishing, …
Capability: Production Facility

**Opto-mechanical labs**: cutting, ultrasonic drilling & laser marking, shaping, lapping, surface polishing, …

Quality Control

Optical Test & Certification **Lab**
interferometric, spectrophotometric, lasers, radiometric, digital profiler, Cs137 radioactive source, …
Coating

Reflectance [%]

Wavelength [nm]

Crystal Scintillators: in-house fabrication & test facility

Crystal growth

Cutting & slicing

Shaping and surface work

Test & characterization

FILAR - Opto Materials S.r.l. www.optomaterials.com
April 10, 2015
www.optomaterials.com
Crystal Scintillators: in-house characterization

Optical & physical tests

Light Yield (LY) & Energy resolution tests
- Source: $^{137}$Cs gamma 662 KeV
- Detector: PMT XP2020Q

\[
LY (\text{photon} / \text{MeV}) = \frac{PP(\text{ch}) - Ped(\text{ch})}{SPHEL(\text{ch}) - Ped(\text{ch})} \quad SPHEL_{\text{PP}} = \frac{1}{0.662}
\]

Internal R&D: Advanced test techniques

Growth Process & Seeding assessment

Material: Composition Micro/Macro-structure, Optical performance

Structural mapping

Light yield and efficiency of scintillators
Internal R&D

Thinfilm & coatings
- Custom recipes
- Physical & optical properties
- Quality investigation: thickness, compactness, resistance, failure, ...

Polishing extent & Surface defects

Co-operation & Projects

- DASS: Distretto AeroSpaziale della Sardegna → 11% share
- SCIMEX socio ISTRID (Istituto Ricerche Studi Informazioni Difesa)
- Physics Dept., University of Cagliari (XRD, PL, Raman)
- INFN Torino & INFN Cagliari → TORTO-LYSO
- INFN Roma & INFN Perugia → LYSO, CsI, BaF2, ...
- Laboratorio di Microscopia Elettronica
- Madrid University, Spain → Fiber laser development
- ESA, CESI, Selex Galileo (HELPS, ALADIN, ATLID)
- Sardegna Ricerche (POR / RPL, PROTO-21)
Co-operation & Projects

FILAR - Opto Materials is open for collaboration in projects or joint ventures in any field and activities in which the company has approved experience and R&D lines.

1. Development of Novel Fiber Lasers
2. Development of Optical Crystal Scintillators
3. Boosting the Production of Synthetic Crystals for Lasers (e.g. Alexandrite)
4. Development of Quantum Cascade and THz Laser Systems

R&D Projects & Results

Materials: Development and delivery of active crystal components for laser systems of measurement on ESA (European Space Agency) satellites for atmospheric LIDAR and laser searching in the space in collaboration with Selex Galileo:
- ALADIN TXA: Already in orbit since 2005;
- Delivery of novel mixed-garnet crystals (YSAG-GGG, YAG-YSGG, and GSAG) compositionally tuned for selective high-power laser space applications;
- HELPS (High Efficient Laser Pump Source): production and delivery of crystal discs based on thermally-bonded YAG-Yb:YAG.
- ALADIN TXA II: Launched by the end of 2011;
- ATLID TXA: System under construction. Scimex has already tested and delivered part of the active material;

Detectors: Production of LYSO, YSO, and LSO scintillating crystals for gamma and X-ray detection in collaboration with INFN (Ca & To)
R&D Projects & Results

**Medical imaging**: Production of LuYAP, LuAP, LYSO, and YbAP scintillating crystals for detection, digital radiography, and PET scanners in collaboration with SAES Getters.

**Medical devices**: Production of medical lasers for medical treatments in dermatology and dentistry (3 laser types with powers 1.5, 2, and 4W).

**Ophthalmic research**: Prototyping of ophthalmic lens for the post-cataracts (partners: FILAR, AILUN, and POEMA).

**Telemetry and eye-safe range-finding**: Prototyping of Er-doped fiber lasers with 1 ns pulse FWHM, tunable 0.1 Hz to 100 kHz repetition frequency, and pulse energy up to 50μJ at λ=1550nm (peak power up to 1500W).

**Directional Infrared Counter Measures (DIRCM)**: Mid-infrared and Quantum Cascade Lasers, material development by MBE and Chemical Beam Epitaxy (CBE), wafer and chip manufacturing, system assembly, and bid testing (in progress in collaboration with the Italian Ministry of Defense).

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Experience in Aerospace Optoelectronics

**Scimex, ESA, Selex & CESI**

Development of new **mixed Garnet** crystals for high-power lasers in space research
GSAG, YSGG, YAG-YSGG, YSAG-GGG

**Compositional tuning: 942-943nm**

J. Appl. Phys. 100, 033101, 2006
Experience in Aerospace Optoelectronics

Scimex, ESA, Galileo Avionica & CESI

HELPS (High Efficient Laser Pump Source)
Development of Yb:YAG laser structures (thermally bonded) for LIDAR applications

Nd:YAG Brewster slabs

Alexandrite Slabs for diode-pumped lasers @ 755nm

We are @ the right site!!

Thank you for your attention

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