

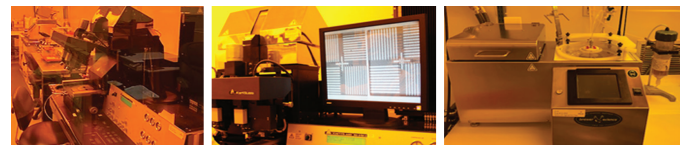
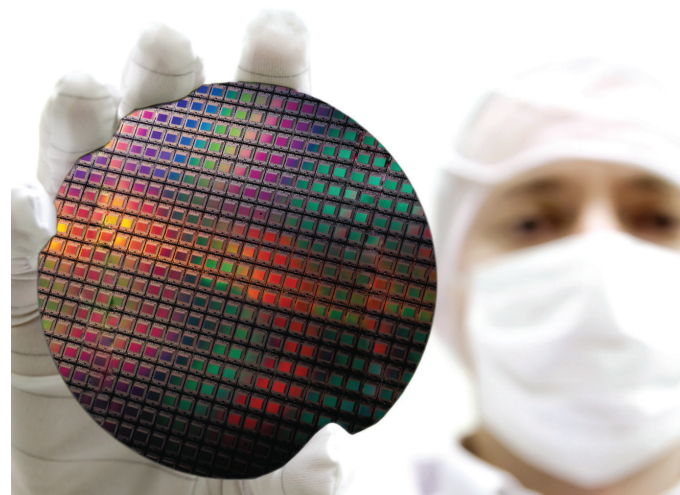


# Photolithography Patterned Filters

Torrent Photonics' micro-patterned optical coatings combine proprietary microlithography processes with end-to-end expertise and advanced coating technology to enable smaller and simpler optical designs for portable or complex optical systems.

## Precision Wafer-Level Filter Arrays & Optical Coatings

- Single-substrate patterning of multiple dielectrics, metals, and color filter arrays
- New, world-class US-based optical semiconductor wafer fab
- Scalable to wafer-level glass or semiconductor volume production
- Tens of millions of custom micro-patterned optical devices produced annually
- Proven manufacturing partner for biomedical, industrial, and aerospace OEMs



## Capabilities

- Custom wavelength bands | UV, VIS, NIR, SWIR
- Dichroic | Bandpass, short-wave pass, long-wave pass, BBAR & more
- Metallic | High reflector, dark absorber, apertures, neutral density & more
- Color filter arrays | RGB, CMYK, & absorptive dyes

## Technologies

- Multispectral sensing
- Multispectral imaging with custom CCD & CMOS sensors
- Precision reticles & alignment patterns
- Patterned pixels & apertures
- Focal plan array (FPA)
- Color mixing & dimming
- Variable/gradient filters

## Applications

- Non-invasive biomedical imaging
- Remote sensing for satellites, defense & precision agriculture
- Industrial QC sensing/imaging
- Color mixing for entertainment lighting
- Sensing for consumer wearables

**Contact our engineers to discuss your application**

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Torrent Photonics' engineering and operations support your development of next-generation imaging and sensing systems.

Our application engineers work with you to quickly assess your requirements and provide a proposal of technical feasibility. Custom geometry patterns including Bayer and Stipe on semiconductor substrates or glass substrates with interference filters, or absorption filters can be fabricated and coated in house.

Our Class 100/1000 wafer fabrication cleanrooms are custom-designed for micro-patterned coatings, enabling us to support ultra-small( $\mu\text{m}$ ) pixel-level features for imaging applications.

### Common Design Parameters

- Substrate: Semiconductor wafers, optical-grade glass, fused silica, or other materials
- Number of filter bands combined on one substrate (multispectral sensing)
- Filter design parameters: Transmission bands, blocking specifications
- Filter selection & approach: interference or absorption
- Feature geometries: smallest size, tolerance in position
- Alignment accuracies and available alignment markers
- Defined (e.g., ESD) handling, dicing, finishing, testing, and packaging

### Discreet Patterning Division Equipment

#### Lithography Process Units

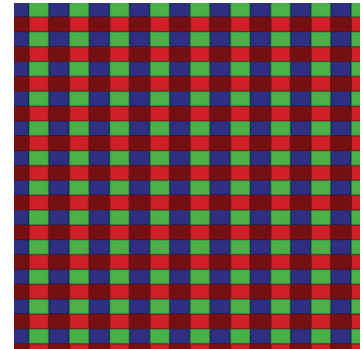
- 1 deep-UV displacement Talbot lithography tool
- 3 mask aligner exposing systems
- 1 reactive ion etching process chamber, glass and silicon etch
- 3 spin deposition tools, automated dispense and edge bead removal
- 2 wet benches, batch development, lift, and strip process
- Semiconductor-style mask alignments to handle wafers up to 8 inches

#### Metrology & Quality Control

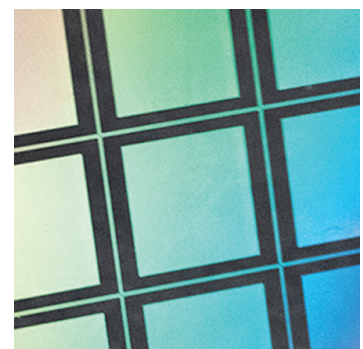
- MicroXAM non-contact white light interferometer
- Ellipsometer film transmission optical modeling software
- Diode array spectrophotometer

#### Coating Chambers

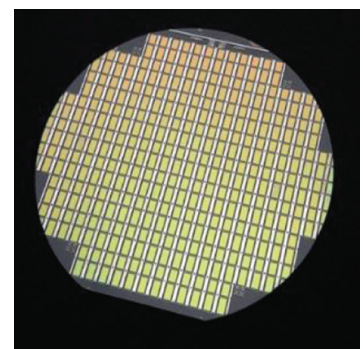
- IAD evaporation
- Magnetron sputtering
- Ion beam sputtering



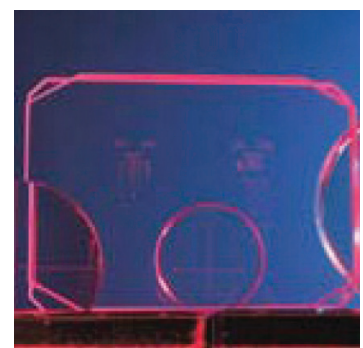
**Custom Geometric Array**



**Transmissive Grating**



**Active Wafer Deposition**



**Precision Reticles**

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