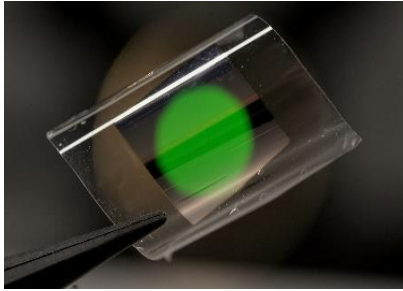


Interference filter

Smart film structures for manufacturing angle-independent interference filters

Invention

Many optical systems, devices and sensors use the principle of interference - an essential factor in the development and optimization of thin-film devices. The challenge is that thin-film interference inevitably leads to dispersion, i.e., to a change in the wave vector when the system is tilted, and the resonance mode shifts to shorter wavelengths.



Parylene C-encapsulated polariton filter as a thin, flexible optical film with angle-independent transmission

To eliminate this dependence on angle, an optical resonator is used that contains an absorbing organic material. Inside this resonator, light couples strongly to electronic transitions in the organic material. This kind of film structure can be produced as thin film for use as bandpass filters.

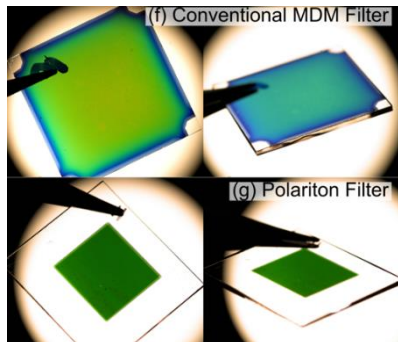
What sets this invention apart is that, unlike conventional dielectric Fabry–Perot filters, the transmitted wavelength does not depend on the light's incidence angle. This produces a particularly precise narrow-band characteristic that can be used not only in bandpass filters but also in narrow-band photodetectors.

Commercial Opportunities

The extremely low angle dispersion and the use of mechanically flexible materials make it possible for this technology to be used in bioapplications or micro-optics/sensors. The manufacture of extremely narrow-band photodetectors over a broad wavelength range, from VIS to NIR, is also possible—even display technology applications are conceivable. A project to develop lens-free fluorescence microscopy is planned.

Current Status

This technology has been validated in lab experiments. An application has been submitted with the German Patent and Trademark Office. Further nationalization is possible under the PCT application. We are offering interested companies the opportunity to license and continue to develop this technology in collaboration with the inventors at the University of Cologne.



Comparison of conventional metal–dielectric–metal filters with heavy angle dependence (top) and the new technology (bottom)

An invention of the University of Cologne.

Benefits

- Very low angle dispersion
- Mechanically flexible materials
- Use in wide wavelength range from VIS to NIR
- Compatible with dielectric filters with ultra-high barrier effect
- Extremely narrow-band transmission filter
- Universal process, incl. for optical sensors

Technology Readiness Level

123456789

Technology validated in lab

Industries

- Electronics
- Photodetectors
- Display technology

Ref. No.

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