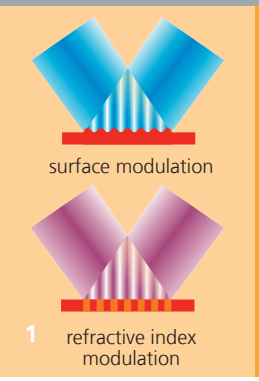
Fraunhofer
IAP

FRAUNHOFER INSTITUTE FOR APPLIED POLYMER RESEARCH IAP



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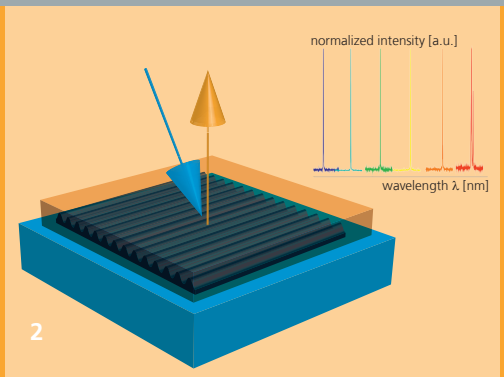

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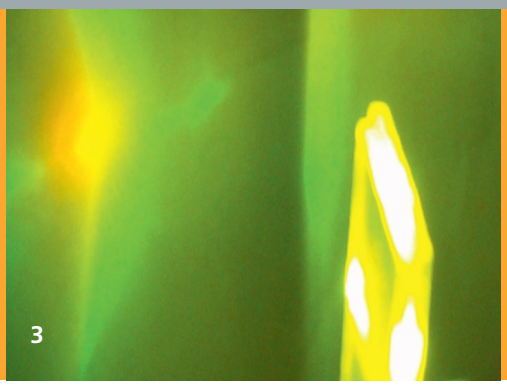
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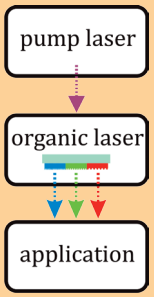

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1 *Holographic recording of surface relief and volume gratings at Fraunhofer IAP.*

2 *Layers of an organic DFB laser and laser emission lines within the visible range of the spectrum.*

3 *Organic solid state laser under excitation.*

4 *Device arrangement for applications.*

PLASTIC LASER

Organic solid state lasers are ideal candidates for low cost laser sources enabling high degree of integration and adaption. They can be used in a wide range of telecommunication or medical applications, such as therapeutic and diagnostic lab-on-chip solutions.

Organic solid state lasers consist of a laser active dye layer on top of a substrate with a periodical modulation of either surface or refractive index in the nanometer range. This results in an optical waveguide structure that acts as a thin film resonator based on the periodic modulation of the effective refractive index. By changing the effective refractive index of the waveguide laser emission wavelength can be shifted. With this it is possible to combine prominent spectral properties of organic laser dyes with compact and adaptable design of thin film lasers.

Due to their polymeric basis it is possible to make use of the features of polymer structuring and preparation like spin coating, nano-imprinting, holography and photolithography. This allows low cost production of high quantities of lasers at different substrate materials. Resonators can be designed with 1-D, 2-D or circular structures. These laser devices show high tunability allover the visible range of the spectrum, narrow emission lines and single mode operation.

Organic lasers can be pumped by commercially available short pulse lasers like nitrogen- or diode pumped solid state lasers. Further improvements show the potential of using laser diodes or even LEDs as pump light sources for organic lasers. This leads to substantial progress concerning device miniaturisation and ease of integration.

Specifications:

Output	up to 100 W/pulse or 100 nJ/pulse (scales on active area)
Wavelength	NUV–VIS–NIR
Rep. rate	up to 1 kHz
FWHM	0.1 nm
Conversion	typ. 1-10 percent
Stability	up to 10^7 pulses

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