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Extract from the annual report 2014
To the website: www.ist.fraunhofer.de/en.html

OPTICAL INTERFERENCE COATING SYSTEMS ON POLYMER FILMS

With optical interference coating systems it is possible to provide surfaces with different optical functions such as reflection reduction or enhancement and spectrally selective filters. Production methods normally used for such coating systems include vacuum-based coating processes such as evaporation techniques, various types of sputter deposition, and plasma-enhanced chemical vapor deposition processes (PECVD). The energy input affecting on the substrate during coating is often critical for organic substrates such as, for example, polymer films. However, due to their bendability and low weight, films of this kind offer new application possibilities, for example, in the field of consumer optics. Optimized coating processes for high-quality optical interference coating systems on polymer films are therefore under development at the Fraunhofer IST.

The coating concept

For the work at the Fraunhofer IST a coating system is being used in which sputter deposition can be combined with PECVD. By using homogenization blends and selecting suitable process parameters, coating thickness conformity and the energy input into the coating process have been improved to the point where very sophisticated optical coating designs can be produced even on plastic film. Process control uses Mocca$^{+®}$, the universal software likewise developed at the Fraunhofer IST. Here the deposition process is controlled with an optical broadband monitor by means of transmission measurements.

The results

With the selected method, triple bandpass filters with over 35 layers have been successfully deposited on PET films (see Figs. 1 to 3). These filters can, for example, be used for creating complementary RGB filters. The layer stack has adequate coating adhesion, in other words, cross-hatch adhesion values of 0–1 on polyethylene terephthalate (PET) and polycarbonate (PC) and an integral light scattering (haze) of less than 4 % on PET or 1.2 % on B270 glass.

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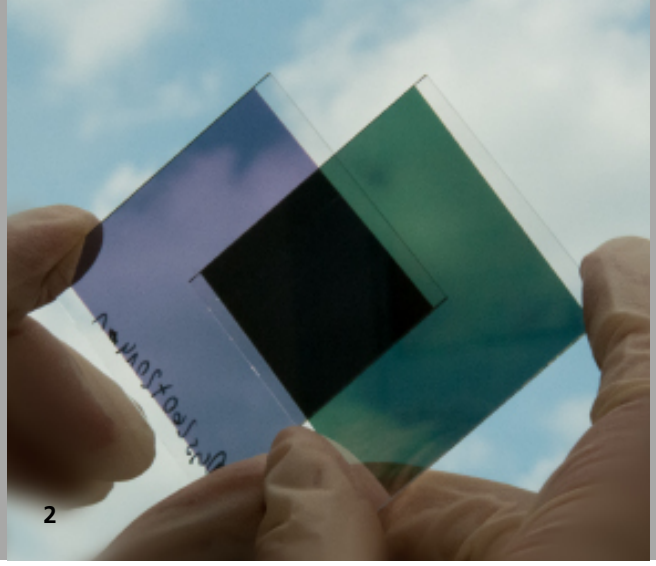

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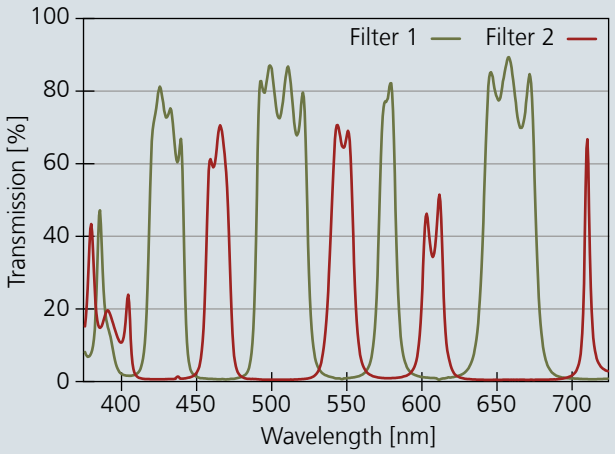
1 *Complementary RGB filter on PET film.*

2 *Complementary RGB filter on B270 glass.*

Outlook

One core theme for future work at the Fraunhofer IST is the organic modification of these kinds of layer system. The aim here is to achieve better formability of the coated films and lower levels of tension.

Measured transmission spectra of two complementary RGB filter on PET film.



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