pography as the only input. In Fig. 3(f) the calculated and measured values of the specular transmittance are plotted as function of wavelength for the investigated surface. While a deviation is seen for wavelengths shorter than 500 nm, the model fits the measured data very well in the rest of the considered interval and the color appearance can be predicted from the AFM image.

The quality of the measured AFM data has proven to be important for the achieved result. The tips used were specially designed for high aspect ratio surfaces in order to be able to resolve relevant features of the surface. The same analysis has been carried out using a standard AFM tip. The result of this analysis showed an increase in the specular transmittance over the entire wavelength interval of up to 0.1 compared to the measured data shown in Fig. 3(f).

Although the AFM measurements have proven adequate for the topographical characterization of the investigated surface, it would be less straight forward to characterize surfaces with structures of higher aspect ratio in detail. This is for example the case for the surfaces of type 2 and type 3 in Fig. 1(b) because the shape of the AFM tip would influence the observed topography more significantly. For prediction of the transmittance for surfaces with such high aspect ratios one may have to investigate other techniques or thoroughly approximate the tip shape and correct for the influence on the observed topography.

4. Conclusion

In conclusion, a route to the realization of cheap single material color filters has been demonstrated based on the concept of light scattering on surface structures. Three distinct colors have been observed for three different surfaces. The scattering characteristics could be reproduced from topographical data and the specular transmittance spectrum could be predicted from a simple model which opens up new avenues for design of single-material plastic color filters.

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