

Press Release XIV / 2017

Hyperspectral imaging for 100%-inspection of surfaces and films

The hyperspectral imaging technology (HSI) perfectly meets the aspiration “to see more than the eye allows”. This novel camera technology enables to image light not only in a spatial but additionally in spectral resolution. To get dedicated sample information, it is now possible to analyze up to thousand spectral bands whereas formerly only three spectral bands (RGB) could be used. Fraunhofer IWS scientists have developed an integrated HSI solution, which implements the potential of the HSI technology into reliable hard- and software. The IWS technology is highly suitable for applications in the fields of surface and film inspection.

Fraunhofer IWS will present the measuring system imanto® *obsidian* at the tradeshow LASER World of PHOTONICS in Munich.

In every production process and R&D developments surface roughness, surface cleanness, material homogeneity or film thickness variations are quality parameter examples, which have to be objectively evaluated and controlled in a non-contact and quick manner. Presently available camera technologies, which mostly simulate human eye’s capabilities, are only able to monitor and evaluate three spectral bands (RGB). In many applications the classical visual inspection is often the method of first choice, notwithstanding obvious disadvantages such as no automation capability and subjectivity of the inspection results. The hyperspectral technology, however, makes it possible to resolve light spatially as well as spectrally. Every sample point is described by up to thousand spectral bands. Thus materials respectively sample structures can be “seen” and the sample can be objectively identified, evaluated and classified.

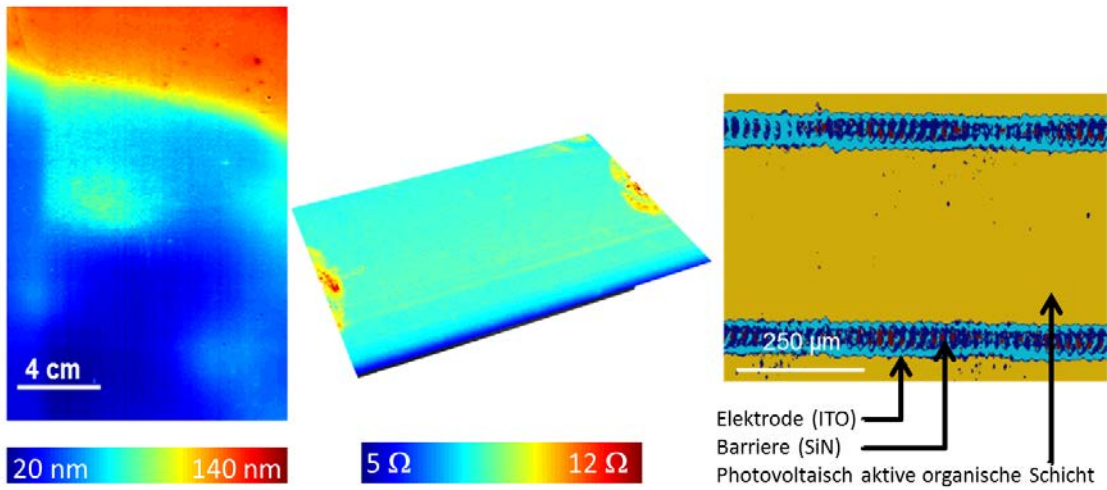
The application of the HSI technology for surface and film inspection requires a coordinated operation of camera, light and motion system. The hardware for data collection together with the routines for data evaluation must be reliably integrated into the software. For precisely these requirements IWS scientists offer their in-house developed solution **imanto® pro**. *Physical-based “hardmodeling” and statistics-based “softmodeling” methods enable a flexible usage of the technique for various sample target parameters. Examples include the generation of images of thin film thicknesses, sheet resistance or optical materials parameters (refraction index, absorption coefficient) and the classification and evaluation of material groups according to own, defined quality criteria. Thus hyperspectral imaging enables the substitution of elaborate laboratory analyses.*

Hyperspectral imaging provides a universal tool to evaluate and visualize the distribution of various surface and film parameters and thus derived sample properties. Thus industrial processes can be explored, be made more efficient and automated.

Our experts are looking forward to welcoming you at the Fraunhofer IWS Dresden or at the tradeshow LASER World of PHOTONICS, hall A2, booth A2.415 (Polytec booth).



imanto® obsidian – measuring system for hyperspectral imaging of surfaces and film © Fraunhofer IWS Dresden



Examples for hyperspectral inspection of surfaces and films
 left: lateral film thickness distribution (AlO_x on stainless steel); center: distribution of sheet resistance (ITO on glass); right: classification of a laser ablation track
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