

## Low-Cost Hyperspectral Chemical Imaging

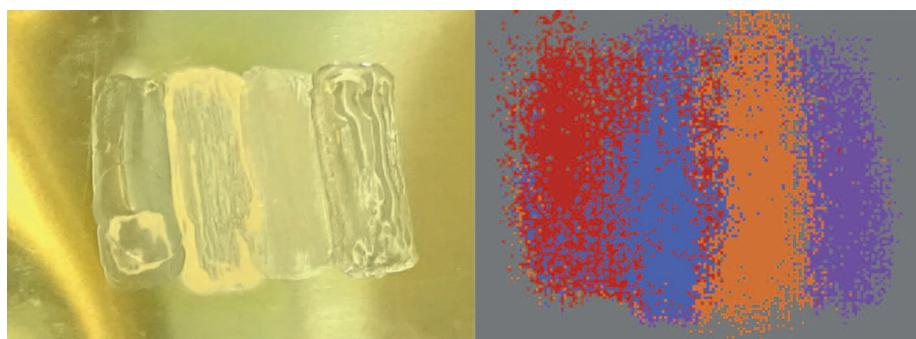
### More than just an image – Hyperspectral imaging for as low as € 500

Recent advances in mid-infrared (MIR) spectroscopy technology, accompanied by cost reductions of the hardware, enable cost-effective and flexible hyperspectral imaging solutions. In addition to an approximately 100-fold cost reduction to existing solutions our technology offers the advantage of high robustness and compact size, making it suitable for integration into handheld devices for the first time. This technology allows spectrally resolved imaging in the mid-infrared fingerprint region at video frame rate. This opens up a large number of applications wherever spatially resolved chemical information is of importance, like impurities or sorting according to chemical composition.

Spatially resolved chemical identification of macroscopic samples is requested in many fields such as industrial process analytics e.g. in food industry, as well as biomedical, pharmaceutical, forensic and cultural heritage science or in atmospheric gas sensing applications. Commercial MIR hyperspectral imaging systems are typically expensive, not portable, not capable of real-time acquisition and bound to fixed sample sizes. By careful selection of suitable low-cost hardware, we can offer customer specific low-cost solutions (< € 500 hardware costs possible) capable of spatially

resolved MIR hyperspectral imaging of macroscopic samples at large distances of tens of cm.

This gives the unique opportunity to obtain spatially resolved chemical information, useful in a large number of industrial and scientific applications, for a very reasonable budget that also allows for mass production. Additionally, the high robustness and small size of the involved hardware components allows for a compact device that can easily fit in any measurement environment, such as handheld devices.



Spatially resolved Hyperspectral Image of four different types of glue, photograph (left) for comparison to spectral image (right), recorded by the novel device and processed by a classification algorithm.

### Facts/Key-Values/ Features & Benefits

- Extremely low-cost hyperspectral imaging solution (< € 500 hardware costs)
- Non-destructive and contactless acquisition of spatially resolved chemical information
- Stand-off measurements up to 35cm successfully tested
- Sample sizes up to the meter range
- Spatial resolution down to the sub-mm range
- Reliable chemical analysis due to operation in the MIR range (fingerprint region)

### Potential Users & Fields of Application

- Industrial process analytics (e.g. food, biomedical, pharmaceutical or chemical industry)
- Forensic applications (e.g. detection of bodily fluids, explosives or drugs)
- Agriculture and food production
- Gas sensing applications
- Product quality control and contamination detection

### Status – what do we offer?

- Customer specific hyperspectral imaging solutions
- Demonstration unit development
- Multivariate image analysis to extract the relevant information

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