Materials analysis business

As one of the first tenants, MATinspired recently moved into the new multiple-occupancy building 'Catalyst' in Eindhoven, the Netherlands. From its base here, MATinspired can further expand its services in the field of high-tech materials analysis for the industry, thanks to its own lab space. The Catalyst Technology & Business Incubator is one of Brainport Development's business centres.

At Catalyst, MATinspired has office and lab space with high-tech measuring equipment; see Figure 1. Because Catalyst is based on the Eindhoven University of Technology (TU/e) campus, MATinspired – previously housed at TU/e's department of Applied Physics – can go on using TU/e's high-tech measuring and other equipment and know-how.

MATinspired helps businesses develop and improve products with the help of measurements and customised research in the field of materials science and nanophysics. The fledgling company was established in 2008 by Niels Kuijpers, who has a Ph.D. in materials science.

MATinspired works for such sectors as the automotive industry, the aerospace sector and the biomedical industry. MATinspired helps customers gain greater insight into their materials in order to improve the quality of their products. Research can also be geared to improving production, such as preventing fractures, deformations, inclusions, stain formation, or coating and welding problems.

Editor's note

This article is based on a MATinspired press release.

www.matinspired.nl

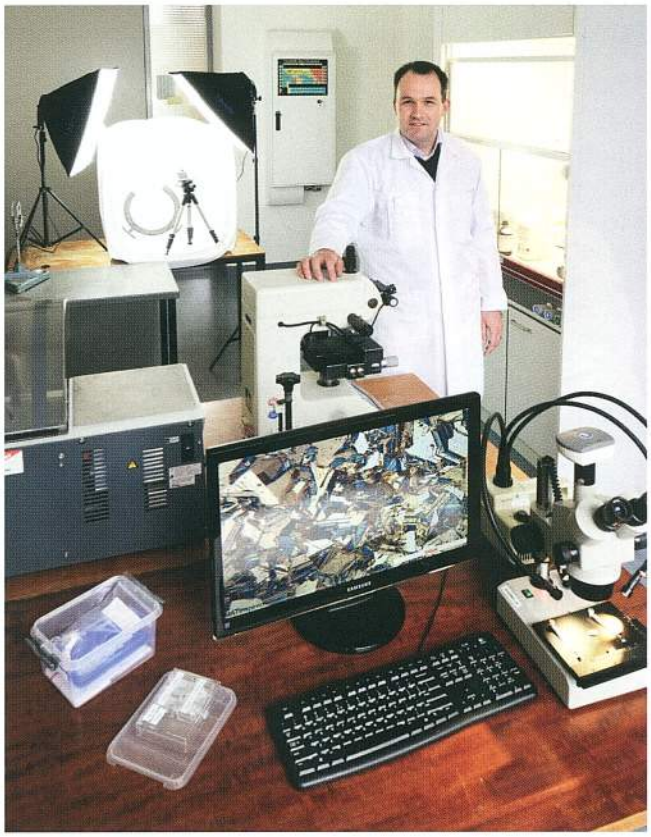

Figure 1. Director Niels Kuijpers in MATinspired's lab. (Photo: Bart van Overbeeke)

in new Catalyst centre

Characterising coatings

An example of the services provided is the characterising of applied coatings, to either determine or check quality. Various techniques are available for characterising a divergent array of layers: from extremely thin coatings with thicknesses in the order of nanometers up to layers of hundreds of micrometers thick.
Examples of layers for characterising are:

- vapour-deposited layers (titanium nitride, silicium nitride, indium tin oxide, silicon carbide, etc.);
- oxide layers (iron oxide, titanium oxide, aluminium oxide, zinc oxide, etc.);
- various semiconductor materials (II-V materials, photoresist layers, solar cell layers, etc.);
- plated layers (gold, copper, chrome, zinc, etc.);
- paint layers;
- organic layers.

Ellipsometry

The layer thicknesses of applied coatings can be determined with nanometer accuracy using the recently acquired Horiba Uvisel Ellipsometer; see Figure 2. Figure 3 shows schematically how the ellipsometer works. In most cases, thinly applied coatings are partially transparent. Ellipsometry uses polarised light that falls onto the sample at a specified angle. Part of this light is reflected directly by the surface, but part of it passes through the coating and is reflected by the substrate (e.g. metal). This impacts the intensity of the total outgoing light. The polarisation direction of the outgoing light is also different. The intensity and polarisation of the outgoing light are measured at various wavelengths. Then, with the help of a computer model, the thickness of the layer is determined to a high degree of accuracy. The advantage of ellipsometry is that measurements are done rapidly and that there is no need to prepare a sample. Measurements can be conducted directly on the sample itself (non-destructive).

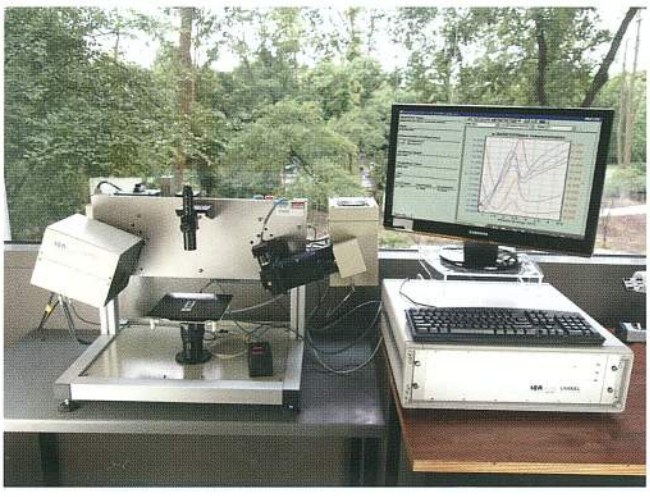

Figure 2. The ellipsometer in the MATinspired lab can accurately determine the thickness of thin coatings.

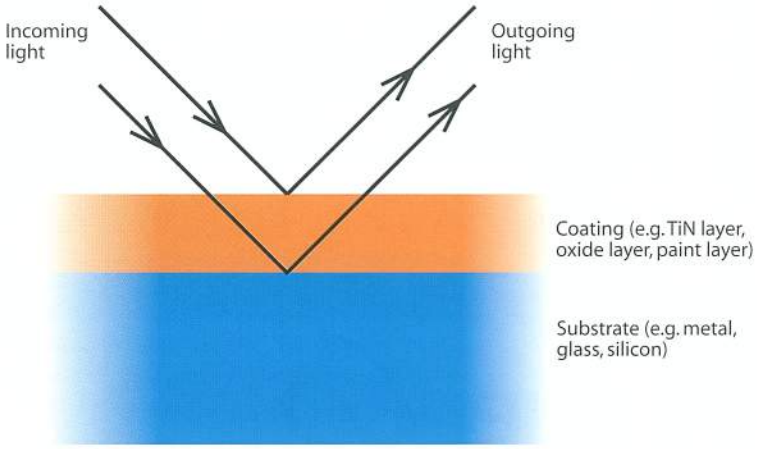

Figure 3. Highly simplified diagram of the working of an ellipsometric measurement of a thin coating.

Catalyst and Brainport Development

The Catalyst Technology & Business Incubator is one of Brainport Development's special business centres in the Eindhoven region, which was voted the smartest region in the world last year by the Intelligent Community Forum. Catalyst, a breeding ground for knowledge and innovation, is aimed at techno-starters whose activities focus on the development and marketing of technologically innovative products, processes and/or services.

www.brainportdevelopment.nl