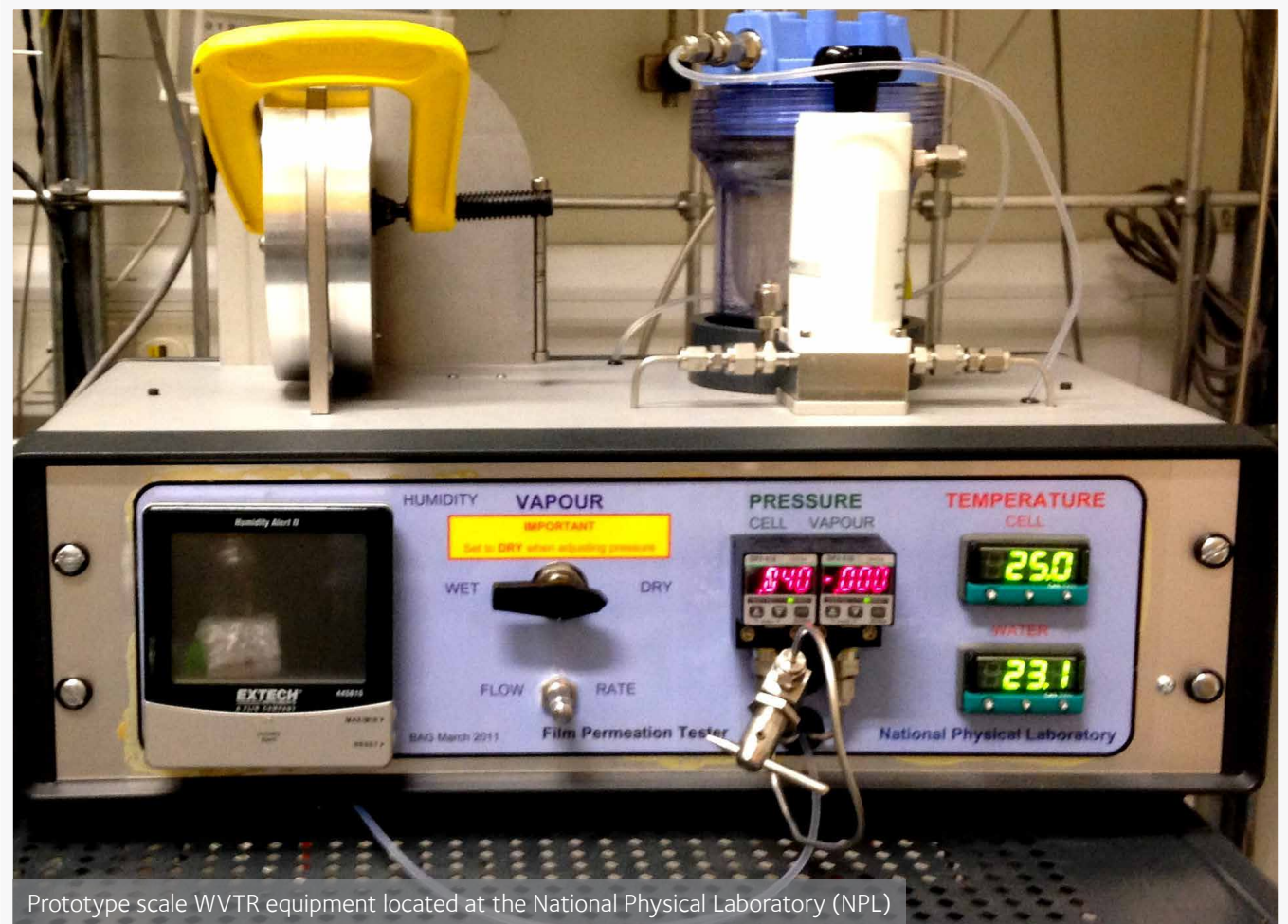


High Sensitivity Water Vapour Transmission Rate (WVTR) Testing of Ultra Barrier Films



Many of the materials used in the production of electronic products are highly chemically sensitive and will react with a wide range of environmental components.

Photovoltaic modules and flexible displays are particularly sensitive in this regard as they require the use of low work function metal cathodes which are extremely sensitive to water.

The Centre for Process Innovation (CPI) and the National Physical Laboratory are collaborating in the development of two complementary high sensitivity water vapour transmission rate (WVTR) techniques for the testing of Atomic Layer Deposition barriers. NPL's is highly accurate and traceable to their dynamic water standard and CPI's is high throughput and low cost.

The NanoMend project will develop the CPI test to the sensitivity and traceability of the NPL test. The target is a technique with a measurement sensitivity of $3 \times 10^{-5} \text{ g m}^{-2} \text{ day}^{-1}$

The key features of this technology are:

- Measurement of very low WVTR ($3 \times 10^{-5} \text{ g m}^{-2} \text{ day}^{-1}$)
- Increased accuracy of parallel testing allows high sample throughput
- Extendable to defect mapping on barriers and testing of edge sealing
- Traceable to national standards for optimal performance assuring high accuracy of the results

NPL Specifications

| Product Information | Value | Unit |
|-----------------------|--------------------|------------------------------------|
| Lower Detection Limit | 3×10^{-5} | $\text{g m}^{-2} \text{ day}^{-1}$ |
| Temperature Range | 22-36 | °C |
| Controlled RH Testing | 50 to 90 | % |
| Sample Size | 100 × 100 | mm |

CPI's parallel test is capable of high temperature ranges (e.g. 100°C). Parallel testing enables high throughput and the sample area can be tailored to the application.

Markets and Applications

Developed as part of the NANOMEND project, the high throughput technology has been established at CPI. It will be used to analyse ultra barriers layers for the following market applications:

- Flexible photovoltaics
- Flexible and printed electronics
- Flexible displays
- Flexible OLEDs

Commercialisation

CPI and NPL are interested in working with clients in the following areas:

- Instrument calibration
- The measuring and quantifying of barrier performance against water permeation
- Technology development, licensing and system operation
- Extending the detection limit to even higher sensitivities, for example: $10^{-6} \text{ g m}^{-2} \text{ day}^{-1}$ and the applications to OLED technology

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Full project title: Nanoscale Defect Detection, Cleaning and Repair for Large Area Substrates



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