

## Higher value in chemicals

The petrochemicals sector continues to be one primed for growth in Singapore, with a strong strategic focus on developing higher value manufacturing on Jurong Island. Keith Boi reports

According to the Singapore Economic Development Board, petrochemical developments on Jurong Island can be expected to continue moving up the value chain along with the ongoing ethylene expansion

The largest manufacturing cluster after electronics, the chemicals industry in Singapore managed to attract a record S\$8.6 billion (US\$6.3 billion) in fixed asset investments, which equates to an impressive 53.7% of the country's total manufacturing investments in that year.

According to figures from the Singapore Economic Development Board (EDB), the chemicals sector generated S\$81.7 billion (US\$60 billion) worth of manufacturing output in 2007. The past year was also characterised by the depth and quality of investments in capital, knowledge and innovation-intensive activities.

The EDB ([www.sedb.com](http://www.sedb.com)) is banking on a growing trend for firms to locate facilities in Singapore to produce high value-added products and to introduce novel manufacturing technologies.

The upcoming ExxonMobil and Shell petrochemical crackers that will double Singapore's ethylene output to 4 million tpa

by 2011 shall provide the added boost, opening up more opportunities for downstream development projects.

"As far as possible, we try to differentiate ourselves from other competing locations by focusing on higher-value investments, which can be in the form of intermediates or polymers," says Loh Boon Chye, EDB deputy director for chemicals. "Increasingly we are also looking at advanced materials and specialty chemicals for growth. Recent projects in Singapore are very much in line with our strategy to move further up the value chain. We expect more of these higher value-added downstream projects to come because of the ongoing ethylene expansion."

Some of the significant projects recently announced include ExxonMobil Chemical's construction of its second petrochemical complex in Singapore comprising a world scale steam cracker and associated derivative units, Mitsui Chemicals investing in a facil-

ity for its second Tafmer resin modifier line and Lanxess building a 100,000 tpa butyl rubber plant.

Loh expresses his confidence about the high level of technology being implemented, citing the example of Lucite's project in Singapore that is the first to use a new proprietary process route (called the Alpha Technology) for MMA products, offering significant advantages to conventional manufacturing technologies.

BASF has also set up its second competence centre (for organic electronics) in Singapore, focusing on the upstream and development in energy management.

Loh concludes: "Singapore offers the benefits of our advanced infrastructure and a highly skilled workforce that can handle complex manufacturing processing. There are also the aspects related to the safe and stable environment here in Singapore and strong intellectual property protection."

### Best protection

One of the latest breakthrough technology developments from Singapore's Institute of Materials Research and Engineering (IMRE) is a new patented film coating technology that protects sensitive devices like organic light emitting diodes (OLEDs) more effectively.

Tests conducted have shown that the new film is 1,000 times more impervious to moisture than other existing technologies, bringing a longer lifetime for plastic electronic devices such as solar cells and flexible displays that use high-end films but whose sensitive organic materials are easily degraded by water vapour and oxygen.

This technology developed by IMRE ([www.imre.a-star.edu.sg](http://www.imre.a-star.edu.sg)) takes an innovative approach to resolve defects such as pinholes, cracks and grain boundaries common in thin oxide barrier films by literally plugging the defects through the use of nanoparticles.

This reduces the number of layers needed in the barrier film construction down to two layers in the unique nano-engineered barrier stack, by which the nanoparticles used in the barrier film have a dual function of sealing the defects while actively reacting with and retaining moisture and oxygen.

Senthil Ramadas, IMRE principal investigator of the project, sees immediate commercial potential for this barrier film technology in plastic electronics and solar cells applications. Plans are underway to launch the first commercial production line by early next year. IMRE has also signed a commercialisation agreement with Kisco to market the barrier films in Asia.