

The Divisions of the Merck Group —→ 4/4

Performance Materials

—→ Liquid crystals from Merck are used throughout the world, in LCD TVs, monitors, tablet computers, notebooks, and mobile phones. We also focus on materials for energy-saving lighting using LEDs (light-emitting diodes) and OLEDs (organic LEDs), as well as for OLED smartphone displays. Pigments for the coatings, plastics and printing industries as well as pigments and active ingredients for cosmetic applications are another important part of Performance Materials portfolio. The division is the market leader for pearl luster effect pigments – a highly specialized niche within the pigment market.

Key products

- LICRISTAL® – Liquid crystal mixtures for displays
- ISIPHOR™ – Phosphors for energy-efficient, high-quality LED lighting
- LIVILUX® – Materials for OLEDs (organic light-emitting diodes) in displays and for innovative lighting
- ISISHAPE® – Efficient, eco-friendly materials for structuring solar cells and touchscreens
- IRIODIN®, XIRALLIC®, COLORSTREAM® – Effect pigments for use in coatings, packaging and product design
- TIMIRON®, COLORONA®, RONAFLAIR®, XIRONA® – Effect and functional pigments for cosmetic formulations
- RONACARE® – Cosmetic active ingredients for skin care

Key developments in 2011

- Continuing strong demand for high-tech liquid crystals from Merck: Total revenues of the LC business rise by 8.0% despite pressure on prices
- Despite a sales decline of 5.4% in the Pigments & Cosmetics business unit, total revenues of the division increase to € 1,467 million
- After the earthquake in Japan on March 11, production of XIRALLIC® effect pigments resumes at the Onahama site in May
- Decision to commission a new XIRALLIC® production line in Germany to increase supply reliability
- Reactive mesogens add new impetus to the LC business
- Divestment of the Crop BioScience business to Novozymes A/S in Denmark

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A broad portfolio

The Performance Materials division comprises our materials businesses and activities. The product portfolio ranges from liquid crystal mixtures for flat-panel LC displays to effect pigments and cosmetic active ingredients. The Performance Materials division consists of the Liquid Crystals and the Pigments & Cosmetics business units. Advanced Technologies develops materials for lighting technologies, photovoltaics and energy storage.

Restrained growth

Despite declining demand from customer segments of the Pigments business, as well as the partially stagnating LC display market, total revenues of the division rose in 2011 by 1% to € 1,467 million, from € 1,452 million in 2010. While the division reported an underlying core operating result of € 525 million, the divestment of the Crop BioScience business in February hindered stronger growth of total revenues. Exceptional items amounted to € 157 million from the divestment of the Crop BioScience business to Novozymes A/S in Denmark.

Performance Materials | Key figures

€ million	2011	2010	Δ in %
Total revenues	1,467	1,452	1.0
Gross margin	874	951	-8.1
R&D	134	131	2.9
Operating result	525	576	-8.9
Exceptional items	157	-1	-
Free cash flow	693	542	28
Underlying free cash flow	492	549	-10
ROS in %	35.8	39.7	

High level of R&D
spending maintained

The Performance Materials division generated more than 70% of its total revenues with liquid crystals. The 8.0% increase in total revenues of the LC business was offset by a decline in the Pigments & Cosmetics business unit, where total revenues were 5.4% lower than in 2010. The division's gross margin decreased by 8.1% to € 874 million from € 951 million in 2010. Consequently, the operating result fell by 8.9% to € 525 million from € 576 million in 2010. This decline was mainly attributable to decreased production capacity utilization at times, increased raw materials costs, as well as additional expenses for new product launches. However, the division's profitability was lower than in 2010; return on sales (ROS) amounted to 35.8% in 2011, compared to 39.7% in 2010. In order to defend and expand our leadership position, we invested steadily in research and development. R&D spending rose to € 134 million in 2011 from € 131 million in 2010.

The earthquake and tsunami that struck Japan in March 2011 and paralyzed the infrastructure in the north-eastern part of the country hardly impacted the division's liquid crystals business. We took advantage of having multiple LC production sites in Asia, using all three to supply our customers in this emergency situation. While the natural disaster did cause damage to the pigments production plant in Onahama, this only slightly impacted the pigments business in the first half of 2011. Production at this site

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resumed in May after an interruption of only four weeks. Merck will additionally begin producing Xirallic® pigments, which are in high demand for automotive coatings, at its German site in Gernsheim in 2012.

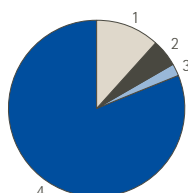
Liquid Crystals: Higher demand in a stagnating market

Falling prices of televisions impact display producers

Flat-screen display manufacturers particularly felt the economic impact of the sharp decline in television prices in 2011. Although our customers responded to the overall weaker economic situation by reducing inventories, total revenues of the Liquid Crystals business unit increased by 8.0% to € 1,094 million from € 1,013 million in 2010. The effects of declining prices and negative foreign exchange rate effects were offset by high sales volumes. This was attributable to the continuing strong demand for our broad portfolio of innovative liquid crystal mixtures used in flat-panel TVs, computer monitors, smartphone touchscreens, and tablet computers. Therefore, the Liquid Crystals business unit, which accounts for the majority of the division's total revenues, continued its solid growth in 2011. This stemmed from the ongoing demand, particularly for IPS (in-plane switching) technologies for smartphone touchscreens and PS-VA (polymer-stabilized vertical alignment) as well as VA (vertical alignment) technologies for TV displays.

Performance Materials | Sales by region

€ million / % of divisional sales



1 Europe	167	11%
2 North America	74	5%
3 Latin America	30	2%
4 Asia, Africa, Australasia	1,194	82%

Success with reactive mesogens

In addition, the business with reactive mesogens developed very positively; sales soared to € 19 million from € 4 million in 2010. Reactive mesogens are polymerizable liquid crystals that can be used, for instance, as a material for optical films, including film-patterned retarder (FPR) products for 3D screens.

With the inauguration of an application laboratory for liquid crystals in Shanghai, we laid the cornerstone for further intensifying cooperation with our customers. We invested around € 1 million in this center.

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OLED technology progressing rapidly

Besides liquid crystal technology, our researchers are working on materials for innovative displays. The special focus of development here is on OLED materials, which are already being used in mobile phones and MP3 players. Having commissioned the OLED Application Development Laboratory (ADL) in Poseung, South Korea, in October, we are further expanding our position in the OLED market of this country. Apart from applications in the display sector, OLED materials can also be used for lighting. They make it possible to create new types of lighting elements that offer diffuse, glare-free light and are extremely energy-efficient. They lend a special atmosphere not only to living spaces, but also any setting requiring unique lighting.

Broad range of innovative LED lighting materials and high-tech materials for photovoltaic technologies

In addition, our researchers are working on innovative lighting materials for LEDs, which are an alternative to conventional light bulbs and energy-saving lamps. Light-emitting diodes increase the color intensity of light and display, consume less energy and help reduce CO₂ emissions.

In the photovoltaics sector, we are developing materials and printing technologies for solar cell production. With the isishape® range, we offer manufacturers printable structuring materials that improve solar cell efficiency and permit eco-friendly production processes. Parallel to this, we are working with leading partners around the world on new technologies, for example dye-sensitized solar cells that imitate nature's photosynthesis process.

Pigments & Cosmetics: Economic developments and inventory reductions impact business

As a result of a decline in demand, total revenues of the Pigments & Cosmetics business unit decreased to € 372 million in 2011 from € 393 million in 2010. Besides the natural disaster in Japan and the associated production outages at our site in Onahama, global economic developments also impacted our Pigments business. Consequently, after a strong start to the year, many of our customers began to reduce inventories. Business with cosmetic active ingredients performed well in the course of the year.

Owing to continuously rising energy and raw material costs, effective November 1, Merck increased its prices for pigments and cosmetic raw materials by 5% to 15% – in individual cases by as much as 30%. The prices for Xirallic® pearl effect pigments were also raised. These pigments are used in high-quality automotive coatings and continue to be a mainstay of our Pigments business. Our decision to establish a second production site for Xirallic® effect pigments outside of Japan will enable us to significantly increase our supply reliability for this very important part of our portfolio.

In 2011, Merck significantly strengthened its expertise both in cosmetic functional fillers and active ingredients as well as in the core business with pearl effect pigments. In addition, we continue to focus our innovation efforts on high value-added segments. We are achieving this by developing products that make it possible to design entirely new effects and by resolutely expanding our highly specialized applications expertise.

Alternatives to light bulbs and energy-saving lamps

Prices for pigments and cosmetic raw materials raised