

RESEARCH & BUSINESS DEVELOPMENT

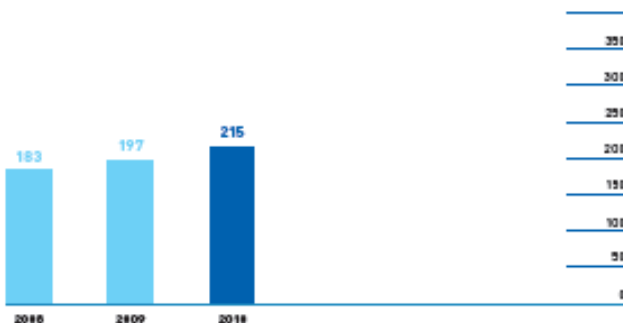
Research and development are the driving forces behind both product competitiveness and corporate growth, playing a key role in corporate sustainability. At KKPC, we renamed our R&D activities “R&BD” or research and business development in 2005 to reflect our philosophy that research should go beyond scientific results to connect with our overall business strategy.

R&BD Organization

Our R&BD activities revolve around the Kumho Petrochemical R&BD Center in Daejeon, which focuses on the synthetic rubbers, synthetic resins, and next-generation materials fields, and the Kumho Electronic Chemicals Laboratory in Asan, which focuses on advanced, value-added materials for the infotech sector. We are the

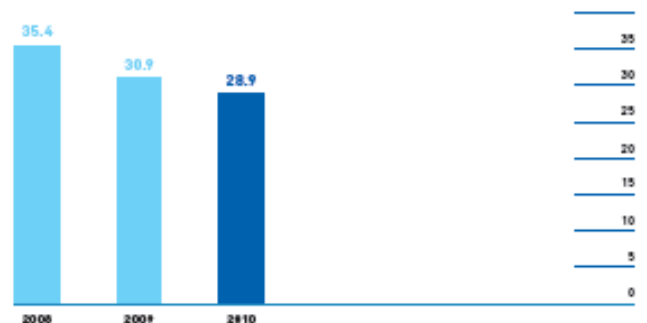
first Korean company to adopt a research ERP system that is integrated with the corporate ERP system. This allows research projects to be thoroughly evaluated based on technical necessity and commercial viability from the outset, enabling our R&BD activities to make a real contribution to our business strategy and bottom line.

R&BD Manpower



R&BD Investments

In KRW Billions





Major Innovations

Solution SBR

SSBR is a value-added product that is a key component of high-performance, lower rolling resistance tires that utilizes polymer end-modification technology to improve tire physical properties. In 2010, we developed an SSBR product in conjunction with a European tiremaker using end-modification technology that improves tire physical properties by more than 10% by maximizing the affinity of the carbon black and silica reinforcement fillers. Sales of tires produced with SSBR are expected to increase when a new EU tire labeling system comes into force in 2012. We are currently in the process of building a dedicated 90,000-mpy SSBR production line at our Yeosu plant.

Eco-Friendly PPG Production Process

Dimethyl carbonate (DMC) is used as a catalyst to produce polypropylene glycol (PPG), the main feedstock used to make polyurethane. It is about 1,000-times more reactive than the commonly used potassium hydroxide (KOH) catalyst, requiring extremely small amounts to achieve the same effect. The eco-friendly DMC process reduces overall processing by 50% by eliminating the water-intensive catalyst removal process, improving productivity and reducing costs. We believe that DMC-based PPG production will grow to exceed 50% of the market over the long term.

Eco-friendly ASA Decorative Film

Decorative film is commonly used as a finishing material for interiors as well as furniture. We have developed Korea's first ASA resin-based eco-friendly decorative film lineup that contains zero toxic heavy metals or environmental hormones and almost eliminates the generation of dioxins when incinerated. No harmful solvents are used in the printing process, and volatile organic compounds are also reduced. We plan to start using the film on our Hugreen window systems, eventually expanding it to furniture and doors.

LEADCAP Warm-Mix Asphalt Additive

We have developed and launched the LEADCAP (low-energy and low-carbon dioxide asphalt pavement) warm-mix asphalt (WMA) additive with the Korea Institute of Construction Technology (KICT). When LEADCAP is used, the production temperature of the asphalt mixture can be reduced 30-40°C, reducing fuel costs as well as the associated CO₂ and harmful gas emissions. It also improves the physical properties of the mixture and aggregate-binder adhesion to enhance road durability. Following successful field trials in Portugal, Italy, and Japan in 2010, we are preparing to aggressively target markets around the globe.





ArF Photoresist

Argon fluoride (ArF) photoresist is a value-added material for making extremely small nanometer-scale patterns in the semiconductor photolithography process when the minimum feature size is under 120 nm. Since beginning mass production of our in-house developed ArF photoresist in 2005, we have emerged as one of Korea's major suppliers. We are currently in the process of developing next-generation products as we target new markets worldwide.

BARC Materials

Bottom anti-reflective coatings (BARC) are applied as an underlayer for photoresist to suppress scattering and standing waves. This prevents under-cut, notching, and standing wave effects, simplifying the semiconductor lithography process. Following the successful commercializing of our first BARC material in 2008, we are now focusing on developing high-n BARC materials for the advanced ArF immersion process in 2011.

Coating Materials for Display Films

These UV-cured transparent liquid coating materials are used in the display and electronic materials fields. Starting with the launch of a hardcoating solution for plasma TV optical films in 2008, we added hardcoating solutions for the LCD and touchpanel industries in 2010. We will focus on coating materials for LCD TV backlight units in 2011.

Photosensitive Polyimide

PSPI is an exceptionally reliable protective packaging material applied in the final photolithography process of the semiconductor front-end process. We completed construction of PSPI manufacturing facilities in 2010 and are now working closely with customers to evaluate it for mass production. In 2011, we aim to expand our PSPI product lineup with solutions for semiconductor front-end and back-end processes as well as the LED and OLED industries.

LCD Sealant

LCD sealant is a key material used in LCD panel manufacturing that Korean manufacturers have relied entirely on imports for to date. We began development of this material in 2006 and sold a prototype large-panel sealant at the end of 2010. We are now conducting mass production testing for large-panel sealant as we prepare to expand into the small-panel sealant segment as well.

