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## Hitachi Chemical's R&D Strategy

– Contributing to Society by Developing Superior Technologies and Products to Pioneer a New Era –

Hitachi Chemical has its origin in 1912 (Meiji 45), when Hitachi Ltd. began research on oil-based varnish. In 1962, Hitachi Chemical was established with the independence of Hitachi Ltd.'s chemical department from the company. Since its founding, Hitachi Chemical has continued to research and develop new businesses and products based on its fundamental technologies, including material technologies, process technologies, and evaluation technologies. These technologies have been fostered by the development of the company's fountainhead products, including insulating varnish, laminated plates, insulators, and carbon brushes. Along with integrating these fundamental technologies, Hitachi Chemical is expanding business by focusing on four key business domains: "Information Communication and Displays," "Automobiles," "Environment and Energy," and "Life Sciences."

In area of communication with customers, Hitachi Chemical is advancing R&D under the business model of "Material System Solution" (MSS). This model seeks to provide our customers with their desired optimum materials, services, and solutions as a suite of systems. We are carrying out this model by combining and adapting our wide-ranging fundamental technologies and extensive business domains, as mentioned above, under the corporate vision of "Contributing to society by developing superior technologies and products to pioneer a new era."

### **[Creating New Products by Integrating and Cultivating Fundamental Technologies]**

Since the founding of Hitachi Chemical, we have been strengthening our materials technologies, including technologies for adhesion, insulation, conduction, heat conduction, transparency, heat resistance, photosensitivity, and fine particles, and our process and evaluation technologies, including technologies for combinations, coatings, moldings, and surface treatments, by integrating and cultivating our diverse technologies. Hitachi Chemical is maintaining superiority in polymer technologies, the fountainhead of our technologies. We are developing new products that differentiate us from our competitors, steadfastly devoting ourselves to our "MSS" business model, which contributes to our customers' value creation, and advancing the development of new products that provide solutions to our customers. An example of product development integrating the fundamental technologies of Hitachi Chemical is our circuit connection (anisotropically conductive) film for liquid crystal display. This film integrates the functions of adhesion and insulation with the functions of conduction. This product was discovered during a process to extend adhesive film technology to semiconductors. Initially, we had sought to create an isotropic film. However, there is a tradeoff relationship between adhesiveness and conductivity, and we discovered a new property in which conductivity differs between the inner film surface and the direction of film thickness. As a result, we created a material that achieves fine adhesion in the micron order, which is difficult to accomplish with conventional solder technology. Hitachi Chemical's transparent interlayer filling film, commercialized in 2010 and superior for mitigating shocks to touch panel screens, is another integrative product combining the technologies for adhesion and transparency which we have



cultivated to this day. We are moving forward with developing this product for application to touch panels, whose market is expected to explode in the future.

#### **[Strengthening R&D in Environment and Energy]**

Because the markets for “Information Communication/Displays” and “Automobiles,” which are drivers of sales and profit for Hitachi Chemical, are expected to grow in the future, we will continue to advance the development of new products by integrating and cultivating our fundamental technologies as the mainstay of our business. In addition, we are devoting ourselves more than ever to the area of “Environment and Energy,” where significant growth is anticipated. We are accelerating the creation of new products in this area. For example, in the area of solar cells, which are expected to grow in demand as a source of renewable energy, we recently productized a conductive film as a substitute for solder. Utilizing the anisotropically conductive film technology as described above, this film can be in direct contact with tab lines and the electrodes of solar cells. Among other products, we have also productized a heat-resistant insulating resin paste that integrates the functions of heat-resistance and insulation. We will continue to advance the development of new products that contribute to improving the conversion efficiency of solar cells. We are also creating new products in the area of “Environment and Life Sciences” by expanding new core technologies through the development of naturally-derived materials, utilizing Hitachi Chemical’s material technologies and analytic/precision technologies, and through joint development with external research institutions.

#### **[Prompt Commercialization of R&D Themes]**

In October of 2010, we considered the market trends of the four major business areas targeted by Hitachi Chemical as described above and the company’s technological potential. This examination resulted in seven new trans-company business creation projects under the theme of “growth domains.” Also, a president-sponsored committee studied and classified marketing issues and inter-departmental issues. The results of this review have led to the strengthening of collaborations between the sales and production departments, for example, to achieve early-stage commercialization of new products.

#### **[Intellectual Property Strategy to Strengthen Competitiveness]**

In addition to the R&D strategies described above, Hitachi Chemical views intellectual property as a resource critical to our business strategies. Based on the philosophy of “actively obtaining and utilizing effective patents to support business strategies,” we are working diligently to build a strong patents portfolio. Specifically, in the process of developing Hitachi Chemical’s “MSS” business model, we are striving to obtain patents not only in the areas of components and materials, but also in the area of processes that utilize these assets. We are devoting energy to establishing rights in these areas. We are actively utilizing this obtained patents portfolio by connecting it to Hitachi Chemical’s business strategies. As a result of inventions and discoveries related to our R&D achievements and prompt filings and activities to establish rights, Hitachi Chemical has risen in rank against our competitors in Patent Result Co. Ltd.’s “Ranking of Capability to Contain Other Companies with Patents.”

#### **[Conclusion]**

By advancing our R&D activities as described above, we at Hitachi Chemical seek to continue to focus on realizing our corporate vision, “Contributing to society by developing superior technologies and products to pioneer a new era.”