

A review of current developments in the semiconductor industry and measures being taken by Japanese manufacturers

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Abstract

Orbray Co., Ltd. has developed many semiconductor and related materials such as sapphire crystal substrates, diamond, ceramics, metallic glass, etc. In recent years, we have succeeded in developing 2-inch diameter diamond substrate in a mass-producible manner, which was thought to be impossible. It's going to realize the social implementation of diamond devices. These materials are the result of many years of constant, painstaking effort. It requires the efforts and perseverance of managers as well as researchers and on-site technology.

In this talk, the current situation of not only diamond but also the Japanese semiconductor industry as a whole will be briefly explained, and the policies and directions that Japanese manufacturing manufacturers are working on will be introduced with examples including our company case.

Orbray Co., Ltd. (Adamant Namiki Precision Jewel Co., Ltd.) has developed a wide variety of semiconductor-related materials, such as sapphire, diamond, ceramics, and metallic glass. Recently, we succeeded in manufacturing a 2-inch diamond substrate, which had been considered impossible. Our dedication to realizing the commercialization of diamond devices requires unremitting effort, not just for researchers and engineers, but also for executives.

Although Japan's semiconductor industry used to dominate the world market, we lost out to competitors in the world. As a result, Japan's share of global semiconductors is less than 10% currently. Likewise, Orbray used to have the largest share of sapphire substrates for LED chips, but our share has drastically fallen compared with competitors in the world. The loss of share for Orbray and Japan's semiconductor manufacturers is essentially the same: lack of policy coordination between Japan's government and its semiconductor-related industry. However, as semiconductor manufacturing are now being seen as having strategic importance for the survival not only of certain industries in Japan but also for Japan as a nation, there seems to be increasing scope for cooperation between the government and the private sector.

At Orbray, we are assiduously working to increase the diameter of our diamond substrates to serve as a basis for next-generation semiconductor applications. In view of past shortcomings, Japan's government, its semiconductor manufacturers, and Orbray are seeking to formulate clear policies to support the development of a strong semiconductor industry that will better serve Japan's security amid an ever-changing global environment.

Japan is not alone in having had to contend with recent issues such as semiconductor supply chain problems due to the global COVID-19 pandemic, the tightening of export regulations for important industries including semiconductors due to US-China discord, and increasing country risks such as the Russia-Ukraine conflict. However, Japan has also been hard hit by the reshoring of production as a result of the strong yen and weak dollar.

In this presentation, the current situation and issues in Japan's semiconductor industry will be presented. I will also introduce some of the policies and measures being pursued by the Japanese semiconductor industry, including Orbray.