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Technology innovations: reshaping the semiconductor landscape

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Seventy years have passed since the first transistor was invented, and engineers have endeavored to scale down semiconductor size. Over time, their efforts have led manufacturing technology, to the micro(10^{-6}) era and the nano(10^{-9}) era, with 10 nano semiconductor commercialization on the verge. With the development of semiconductor technology, the Personal Computer in the 1990's, the Internet in the 2000's, and the Mobile in the 2010's became the most successful industries of their period. Today, semiconductor plays a pivotal role in improving our lives by enabling Information Technology. At the same time, semiconductors themselves are continuously evolving through further developments of core technologies such as process, equipment/material technology. One of the core technologies, the vacuum technology is becoming more fundamental one essential to semiconductor manufacturing process technologies. For instances, more than 80% of the film deposition process is already being conducted under vacuum environment, and it is believed that sub-10 nano process technologies may not be enabled without fully utilizing the benefit of vacuum technology. Creative technology revolutions have constantly been seeking, and overcoming the once-thought-to-be physical and technological limits, through new technologies such as 3-dimensional semiconductors. We expect the use of semiconductors to increase even further with the convergence of intelligence and technology that will come as Artificial Intelligence, Autonomous Vehicle, Internet of Things, Bio-Technology, etc. In this paper, a perspective on future semiconductor industry and technological innovations for realizing future semiconductor will be reviewed.