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### **Title:**

Recent Progress of RF Acoustic Wave Devices Gifted by MEMS Technologies

### **Abstract:**

65 years have been passed from the first report on surface acoustic wave (SAW) devices, and 41 years from proposal of thin-film-based bulk acoustic wave (BAW) resonators. Nevertheless, these devices still keep on evolving in surprisingly high speed to fulfill severe demands given by the market. Various MEMS technologies have been applied to these devices, and the hottest topic for last five years is use of extremely thin piezoelectric layer realized by the wafer bonding.

This talk is aimed at overviewing recent progress of SAW/BAW devices for the mobile phone market. First, the market trend is surveyed to explain why extremely high performance RF SAW/BAW devices are necessary. Then a SAW device using very thin piezoelectric layer is introduced, and it is shown how drastic improvement was given by the use of wafer-bonding technology. Finally, recent research trends on RF SAW/BAW devices are given. They are also based on very thin piezoelectric layers and intended to application to 5G/6G systems.

### **Biography :**

Ken-ya Hashimoto was born in Fukushima, Japan, on March 2, 1956. He received his B.S. and M.S. degrees in electrical engineering in 1978 and 1980, respectively, from

Chiba University, Japan, and his Dr. Eng. degree from Tokyo Institute of Technology, Japan, in 1989. In 1980, he joined Chiba University as Research Associate, and retired there as Professor Emeritus in 2021. In the same year, he joined the University of Electronic Science and Technology of China, Chengdu, China, as Professor.

He was a Visiting Professor in many Universities such as Helsinki University of Technology, Finland, Johannes Kepler University of Linz, Austria, and Shanghai Jiaotong University, Shanghai, China.

He was chosen as an IEEE Fellow (2005) and received numerous awards such as the International Distinguished Lecturer Award from the IEEE UFFC Society (2005), the Ichimura Industrial Award from the New Technology Development Foundation (2015), The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (2018), and IEEE UFFC Distinguished Service Award (2019).

His current research interests include simulation and design of various high-performance surface and bulk acoustic wave devices, acoustic wave sensors and actuators, piezoelectric materials and RF circuit design.