Speech subject： Nanotwinned silver films for low-temperature interconnection: magnetron sputtering deposition, microstructure optimization, and thermo-compression bonding

Speech leader: Hongjun JI, Professor, Harbin Institute of Technology, Shenzhen

Speech Description/Objective:

As the interconnection pitch of chips continues to shrink, solid-state bonding has emerged as a crucial technology for achieving high-density chip interconnects. Nanotwinned silver, characterized by its good capability for low-temperature interconnection, high electrical and thermal conductivity, and excellent thermal stability, represents an ideal material for low-temperature solid-state bonding. This keynote addresses the demand for high-density chip interconnects, detailing the preparation and low-temperature thermo-compression bonding of nanotwinned silver. It integrates research findings from our group, focusing on magnetron sputtering deposition of nanotwinned, analyzing the influence of sputtering parameters on its microstructure (grain size, transition layer thickness, and texture) and properties, as well as the microstructure evolution of silver film during deposition. Furthermore, the keynote will discuss the low-temperature thermo-compression bonding process of nanotwinned silver, discussing the interfacial microstructures of bonded joints and exploring the bonding mechanisms under pressure-thermal coupling.

Speech Outline:

1. Requirements and challenges in chip low-temperature interconnection;
2. Magnetron sputtering preparation and microstructure optimization of nanotwinned silver, including the effects of sputtering process parameters on the microstructure and properties of nanotwinned silver, and the formation mechanism of nanotwins;
3. Low-temperature thermo-compression bonding of nanotwinned silver.

Who Should Attend:

Researchers and practitioners in the field of electronic packaging interconnect materials and technologies

Introduction of Speaker:

Hongjun Ji earned his doctoral degree in engineering at Harbin Institute of Technology in 2008, currently he is a professor at the School of Integrated Circuit at Harbin Institute of Technology (Shenzhen). He has been engaged in research on power ultrasonic-assisted micro-nano joining and advanced interconnection for electronic packaging for a long time. His research results have been published in more than 80 SCI papers in international high-level professional journals such as IEEE Transactions on Power Electronics, Scripta Materialia, and Ultrasonics Sonochemistry, and more than 50 papers presented at international conferences. He has participated in the compilation of a monograph and obtained nearly 20 Chinese patents. He has led more than 10 provincial-level and ministerial-level longitudinal projects, including the National Natural Science Foundation of China. He has made nearly 40 oral presentations at top international electronic packaging conferences such as ECTC, ICEPT, as well as international conferences like TMS, MS&T, and EAST-WJ. He has also delivered nearly 10 invited session presentations at international conferences such as IFWT2018, 2019 IEEE NANO, and IFAM in 2020 and 2021. He serves as a youth editor for the “Journal of Materials Science and Technology” and other

journal editorial board positions. He is a senior member of the Chinese Electronic Society, a member of the American TMS, a member of the Youth Working Committee of the Welding Institute of the Chinese Mechanical Engineering Society, and a director of the Ultrasonic Materials and Technology Committee of the Chinese Materials Research Society.