Electrostatic Discharge (ESD) Challenges in Modern and Future Integrated Circuits

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Electrostatic discharge (ESD) is a process in which a finite amount of charge is transferred from one object (i.e., human body) to the other (i.e., microchip). This process can result in a very high current passing through the microchip within a very short period of time, and more than 35% of chip damages can be attributed to such an event. As such, designing on-chip ESD structures to protect microchips against the ESD stress is a high priority in the semiconductor industry. The continuing scaling of CMOS technology makes the ESD-induced failures even more prominent, and one can predict with certainty that the availability of effective and robust ESD protection solutions will be a critical component to the success of the deep sub-micron technology advancement.

An overview on the ESD sources, models, protection schemes, and testing will first be given in this talk. This is followed by the discussions of the challenges for designing and realizing ESD protection solutions in modern and next-generation integrated circuits.