Breakthrough In Current In Plane Metrology For Monitoring Large Scale MRAM Production

The current-in-plane tunneling technique (CIPT) has been a crucial tool in the development of magnetic tunnel junction stacks suitable for Magnetic Random Access Memories (MRAM) for more than a decade. The MRAM development has now reached the maturity to make the transition from R&D to large-scale production. This will require a metrology to precisely monitor the properties of the MTJ stacks over 300 mm wafers with high performance in terms of reproducibility and repeatability. Here, we present a major breakthrough in the CIPT metrology that can deliver a substantial improvement on the precision of the Resistance Area product (RA) and the Tunnel Magnetoresistance (TMR) measurements, compared to state of the art CIPT metrology tools dedicated to R&D. On two test wafers, the repeatability of RA and MR was improved up to 350% and the measurement reproducibility up to 1700%. We believe that CIPT metrology now constitutes a very strong candidate for monitoring MRAM production, since it can guarantee the high metrology performance needed for the advent of the MRAM era.

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