

Magnetic recording sensors (CIP, CPP, MTJ, etc.)

Recently, as the areal density of magnetic recording hard disk drive technology is being dramatically increased up to 1 Tbit/in² at an incredible rate of 200 % per year, a smart magnetic recording read sensor with high sensitivity, high signal-to-noise ratio (SNR), and extremely narrow track width and small shield-to-shield gap is essentially required. Accordingly, the current-perpendicular-to-the plane (CPP) geometry of GMR and TMR read sensors, which have been recently developed, are being paid a considerable attention as the best potential candidates for the next generation of read sensor due to its superior device performance compared to the conventional current in-plane (CIP) GMR read sensors.

For regarding to this research area, ISML primarily focuses on four main research activities: 1) to develop new type of CCP (Current Confined Path) CPP read sensors using sputtered half metallic thin films, 2) to study on the noise characteristics of CPP GMR read sensor structures due to the interfacial microwave induced noises caused by the perpendicular to the plane direction of bias current, 3) to develop defect free and high crystalline texture of tunnel barriers for MTJ read sensors and to investigate the physical origin of various noises in MTJ read sensors including thermal (Johnson) noise, Flicker noise, and Shot noise, and 4) to study on the electrical and magnetic reliability of CCP-CPP GMR, CPP GMR, and CPP MTJ read sensors.

Magnetic random access memory

