

CL52_Q1. What is Giant Magneto Resistance and mention its important applications.

Ans:

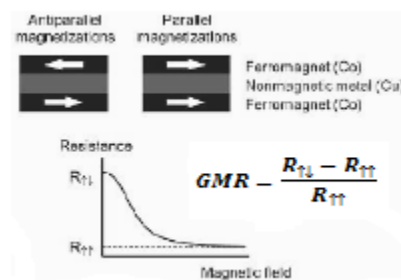
The Giant Magneto-resistance (GMR) is the observed large change in the electrical resistance when a magnetic field is applied to thin films composed of alternating ferromagnetic and nonmagnetic layers. That is in GMR device, the resistance across the thickness of two magnetic layers (generally Cobalt) separated by a non-magnetic layer (generally Copper) shows a dependence on the magnetization states of the individual layers. This effect is attributed to the spin scattering of the electrons when they flow through the material.

Applications: Read head of magnetic memories and various sensors.

CL52_Q2. Briefly describe the structure of a GMR nano-device.

Ans:

GMR devices are layered magnetic materials where the resistance across the thickness of two magnetic layers (generally Cobalt) separated by a non-magnetic layer (generally Copper) shows a dependence on the magnetization states of the magnetic layers. That is, resistance to current flow depends on the direction of magnetization of the



magnetic layers and can show large variations in the resistance. This is due to the spin scattering of the electrons when they flow through the material. The scattering of electron is reduced when the magnetization of the two layers is parallel. When the spin state of the two layers are anti- parallel the scattering and hence the resistance increases.

CL52_Q3. Elaborate the significance of magnetization states of the magnetic layers towards giant magneto resistance.

Ans:

In a GMR device, the resistance across the thickness of two magnetic layers (generally Cobalt) separated by a non-magnetic layer (generally Copper) shows a dependence on the magnetization states of the magnetic layers. The effect of magneto-resistance is due to the spin scattering of the electrons when they flow through the material. The scattering of electron is reduced when the magnetization of the two layers is parallel and shows low resistance. When the spin state of the two layers are anti- parallel the scattering and hence the resistance increases.