

EXTRAORDINARY MAGNETORESISTANCE SENSOR WITH PERPENDICULAR MAGNETIC BIASING BY AN ANTIFERROMAGNETIC/FERROMAGNETIC EXCHANGE-COUPLED STRUCTURE

ABSTRACT OF THE DISCLOSURE

An extraordinary magnetoresistance (EMR) sensor has an antiferromagnetic/ferromagnetic exchange-coupled bilayer structure on top of the EMR active film. The ferromagnetic layer in the bilayer structure has perpendicular magnetic anisotropy and is exchange-biased by the antiferromagnetic layer. The antiferromagnetic/ferromagnetic bilayer structure provides a magnetic field perpendicular to the plane of the EMR active film to bias the magnetoresistance vs. field response of the EMR sensor. The ferromagnetic layer may be formed of any of the ferromagnetic materials useful for perpendicular magnetic recording, and is prepared in a way that its anisotropy axis is significantly out-of-plane. The antiferromagnetic layer is formed of any of the known Mn alloys, such as PtMn, NiMn, FeMn, IrMn, PdMn, PtPdMn and RhMn, or any of the insulating antiferromagnetic materials, such as those based on the cobalt oxide and nickel oxide antiferromagnetic materials.