A Low-Cost and High-Temperature Vibrating Sample Magnetometer

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In this work, our aim is to design and made a low-cost vibrating sample magnetometer (VSM) operating in the temperature range between 20 and 500 °C for the study of magnetic properties of materials. A high temperature and inexpensive vibrating sample magnetometer (VSM) has been constructed. An experimental set up for Curie temperature and susceptibility measurement is designed. Calibration measurements taken with standard sample -Neobidium magnet- and the performance compared very well with extremely costly imported systems. Measurements for samples -Neobidium and Strronium ferrit - were taken at room temperature. Magnetization(M) change was observed at different Magnetic field strength(H) on Hysteresis loop successfully. For finding Curie temperature, magnetization versus Temperature graph plotted between 20 and 500 °C . Curie temperature of Stronium Ferrit was measured approximately equal to 461°C. For effects of temperature on magnetic properties, hysteresis graphs plotted at 20ºC, 120 ºC, 300ºC and 400 ºC. A decrease in the the slope of the curve was observed at temperature closer to Curie temperature. Magnetic susceptibility was calculated at different temperature .As temperature increases, the magnetic susceptibility (?0), that is, the reaction of magnetic material when placed into external magnetic field, decreases. According to this result , the material lost magnetic properties at high temperature. In this study, Curie temperature and susceptibility of magnetic material determined successfully by developing an inexpensive vibrating sample magnetometer “VSM”. An exercise using VSM allowed us to measure the magnetic properties of various materials and thus gained experience applicable to our contemporary research on magnetic materials.

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