C38

Initial magnetic degradation in TMR heads due to temperature increase caused by electrostatic discharge

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We investigated the initial magnetic degradation in tunneling magnetoresistance (TMR) recording heads caused by electrostatic discharge (ESD). To analyze the temperature increase caused by the electrostatic discharge we used three different models, the human body model (HBM), the machine model (MM) and the charged device model (CDM). The spatial and temporal temperature profile was calculated using three-dimensional finite element methods. Our results indicate that although the highest temperature occurs in the MgO barrier layer the initial magnetic modification likely arises in the IrMn antiferromagnetic layer, due to its low Néel temperature.

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