

Effect of Rapid Thermal Annealing on the Properties of CoFeB/MgO/CoFeB Magnetic Tunnel Junctions

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To achieve a high tunneling magnetoresistance (TMR) of sputtered magnetic tunnel junctions (MTJs) with an MgO barrier, the annealing process is indispensable. The structural and compositional changes as consequences of the annealing greatly affect the spin-dependent transport properties of MTJs. The rapid thermal annealing (RTA) process was used for annealing the MTJs with synthetic antiferromagnets. The systematic investigation of RTA effects on the properties of MTJs by minute controlling the process time and temperature is addressed. A significant change in TMR value and barrier parameters occurs within 10 sec during RTA. The dependence of TMR on annealing time and temperature provides the information about crystallization of electrodes and diffusion processes occurred in MTJs. The structural and compositional analyses were also performed to clarify the effect of annealing on the properties of MTJs.