

Abstract Submitted
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MgO Growth Conditions for Magnetic Tunnel Junctions¹ SE YOUNG O, National Institute of Standards and Technology & Changwon National University, CHAN-GYU LEE, Changwon National University, ALEXANDER SHAPIRO, WILLIAM EGELHOFF, MARK VAUDIN, JENNIFER RUGLOVSKY, JONATHAN MALLETT, PHILIP W.T. PONG, National Institute of Standards and Technology — A comprehensive study of MgO growth conditions is essential for making high TMR MTJs. We have carried out a systematic study optimizing the MgO growth via presputter and sputtering conditions and underlayer structures. It was found that to prevent water vapour which is detrimental to MgO (200) growth, the chamber pressure needs to be reduced below 1.3×10^{-6} Pa (10^{-8} Torr). Pre-deposition ion milling for cleaning the thermal-oxide substrate before depositing metal films does not improve the subsequent MgO crystal growth. Simple underlayers such as 5 nm CoFeB tend to give better MgO, but we have also succeeded in growing MgO on more complicated underlayers. We found that both presputter and sputtering conditions have important effects on the MgO growth. X-ray diffraction (XRD) analysis was used as the characterization tool for optimizing the MgO growth conditions.

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