

## **MEMS based *in-situ* magnetometer system**

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We have developed an ultra sensitive magnetometer tailored to the study of thin-film interface magnetism and interlayer magnetic exchange couplings. The magnetometer was composed of an optical fiber interferometer and a customized silicon cantilever that was fabricated using silicon micro-electromechanical systems (MEMS) technology. The performance of the magnetometer was gauged by measurements of chromium-iron (Cr/Fe) interface and the couplings of Fe/Cr/Fe trilayer system deposited on Si <110> substrate. The antiferromagnetic stacking of the Cr layers of Fe/Cr system and the parallel or antiparallel coupling between the bottom Fe and the top Fe layers with Cr spacer thickness was monitored with the MEMS magnetometer. We found the oscillation periods of the interlayer exchange coupling in Fe/Cr/Fe trilayer system and compared them to the previous theoretical calculations.