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## **Characterization of YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7</sub> thin films on miscut LSAT substrates**

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Magnetoencephalography (MEG) is an alternative noninvasive brain imaging technique that measures the magnetic field generated by neuron activities. MEG offers better temporal resolution than current imaging systems. Superconductor Quantum Interface Devices (SQUIDs) are the sensors used in MEG systems. High-transition-temperature-superconductor (HTS) SQUIDs could potentially improve the resolution and sensitivity of the images and reduce both fabrication and operation costs. However, most HTS SQUIDs are noisier than Low-Temperature Superconductor SQUIDs. Grain boundaries and twinned planes are some of the sources of noise in these materials. Therefore, in our research, we aim to investigate the noise caused by twinned grain boundaries. To reduce the noise, we propose a possible way of getting better lattice match between the substrate and the film using miscut lanthanum aluminate - strontium aluminum tantalate (LSAT) at different angles with the YBa<sub>2</sub>Cu<sub>3</sub>O<sub>7- $\delta$</sub>  (YBCO) layer. Commonly, LSAT has a perovskite crystal structure. Whereas, by using a miscut, it can appear as orthorhombic. In this presentation, we will show the atomic force microscope (AFM) and scanning electron microscope (SEM) results of YBCO grown on substrates with various miscut angles. The surface properties from AFM and SEM will be compared with the ones in the literature. In addition, to determine the YBCO crystal quality, we implement X-ray diffraction (XRD) and rocking curve full width at half maximum measurements in order to investigate and compare the defects such as mosaicity, dislocations, and curvatures of the films. Finally, we will present the electrical transport properties such as resistivity vs temperature and residual resistivity of the miscut films using Van der Pauw method to show the asymmetric conductance in the a-b plane of YBCO.

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