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Structural and Electrical Properties of Thin Films of Electron-doped Mixed-Valent Rare Earth Manganites¹ ZOEY WARECKI, GRACE YONG, DAVID SCHAEFER, RAJESWARI KOLAGANI, Towson University — Research in thin films of mixed valent rare earth manganese oxides has largely been focused on hole-doped manganites that exhibit colossal magnetoresistance. Hole doped manganites are derived from trivalent rare earth manganese oxides, where the hole doping (introduction of Mn^{4+} ions to replace the Mn^{3+} ions) is the result of substitution of the trivalent rare earth site (such as La^{3+}) by a divalent alkaline earth element (such as Ca^{2+}). In contrast, electron doped manganites can be obtained by introducing Mn^{3+} ions to replace Mn^{4+} ions in an alkaline earth manganese oxide. We are currently investigating the properties of electron-doped manganites which are derived from CaMnO_3 . We use Pulsed Laser Deposition to grow these epitaxial thin films. One way to introduce electron carriers in the film is by creating an oxygen poor environment during the deposition, causing the film composition to be of the form $\text{Ca}^{2+}\text{Mn}_{1-2x}^{4+}\text{Mn}_{2x}^{3+}\text{O}_{3-x}^{2-}$. Another method is by substitution of the Ca^{2+} site by rare earth elements of valency 3+ or higher (such as Ce^{4+} or Ho^{4+}) to introduce electron carriers. We will report our study of the structural, electrical, and magneto-transport properties of electron doped manganite thin films, focusing on the sensitivity of these properties to growth parameters.

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