Evolution of Physical Properties with Mn Content in Sr$_3$(Ru$_{1-x}$Mn$_x$)$_2$O$_7$ Single Crystals BIAO HU, E.W. PLUMMER, R. JIN, Department of physics and Astronomy, Louisiana State University — We have systematically studied the doping dependence of physical properties of Sr$_3$(Ru$_{1-x}$Mn$_x$)$_2$O$_7$ with $0.0 \leq x \leq 1.0$. Although the undoped Sr$_3$Ru$_2$O$_7$ is a paramagnetic metal, partial substitution of Ru by Mn results not only in metal-insulating transition ($T_{MIT}$) but also in complex magnetic ordering at $T_M$. Interestingly, the difference between $T_M$ and $T_{MIT}$ ($T_M < T_{MIT}$) increases with increasing doping level $x$. The correlation between these two transitions will be reported.