Acoustic and Optical Properties of Er$^{3+}$- doped LiNbO$_3$ ALEM TEKLU, NARAYANAN KUTHIRUMMAL, DANIEL MORRALL, JAY DANDREA, College of Charleston — Elastic constants of pure and Er$^{3+}$-doped lithium niobate (LiNbO$_3$) single crystals have been determined using resonant ultrasound spectroscopy (RUS). When comparing the elastic constants for pure and doped LiNbO$_3$ crystals, the bulk modulus was found to increase by 5.2% after doping. Also the elastic constants were compared. $C_{11}$ decreased by 4%, $C_{12}$ increased by 18% and $C_{44}$ increased by 16.6%. The surface-doping explains the decrease in elastic constant in only one direction. The presence of Er$^{3+}$ ions on the surface of LiNbO$_3$ has been monitored using photoacoustic spectroscopy. The photoacoustic spectrum revealed very weak absorptions corresponding to $4F_7/2$, $4F_9/2$ and $2H_{11/2}$ levels of Erbium, indicating the presence of Erbium.