$^3$He Condensation and Dissolution at Layer Completion in $^3$He-$^4$He Mixtures Adsorbed on Carbon Nanotubes GARY WILLIAMS, EMIN MENACHEKANIAN, JOHN ABRAHAM, BOB CHEN, VITO IAIA, ANDREW LI, SERGEY SUSHCHIKH, UCLA — The condensation and then dissolution of $^3$He has been observed at layer completion in $^3$He-$^4$He mixtures adsorbed on multiwall carbon nanotubes. With an initial fill of 3.5 layers of $^4$He, the addition of $^3$He in five steps of 0.07 layers uniformly reduces $T_{KT}$, showing that the $^3$He is uniformly distributed. With the final 0.35 layer of $^3$He still present, additional $^4$He is then added at low temperature (225 mK). An abrupt transition is observed in the third sound signal very near the total-thickness 4.0 layer completion, where the Q factor suddenly drops by two orders of magnitude and the sound speed becomes constant. With the addition of another 0.1 layer of $^4$He the sound speed starts to decrease again and the Q climbs back to its initial value. We postulate that this behavior marks the formation of condensed $^3$He “islands” induced by the layer completion, and then the $^3$He dissolves back to uniform coverage past that point.