model in the 0.2~2.0 THz band. For nanowhiskers 418nm and 698nm in heights, the plasma frequencies are 864 versus 920 rad·THz, and carrier scattering time are 60 versus 69 fs, respectively. The carrier mobility, carrier concentration are also determined to be 2 versus 26 $cm^2V^{-1}s^{-1}$, 7 versus 8 × 10^{19} cm^{-3}, respectively. Our results indicate that the ITO nanowhiskers and its bottom layer atop the substrate exhibit longer carrier scattering times than ITO thin films. This signifies that ITO nanowhiskers have an excellent crystallinity with large grain size, consistent with X-ray data. Besides, the expectation value of cosine of scattering angle is ($\gamma \sim -0.96$). This indicates a strong backscattering effect and fully carrier localization in the ITO nanowhiskers. Thus ITO nanowhiskers are attractive for THz device applications, in additional to its broad interests for the visible spectral range.

Acknowledgments

This works was supported by a grant of the National Science Council 99-2120-M-006-002 and the Academic Top University Program of the Ministry of Education. The authors would like to thank Professor Hao-Chung Kuo for use of the electron-beam evaporator. They would also like to than Prof. Tsing-Hua Her for many useful discussions.