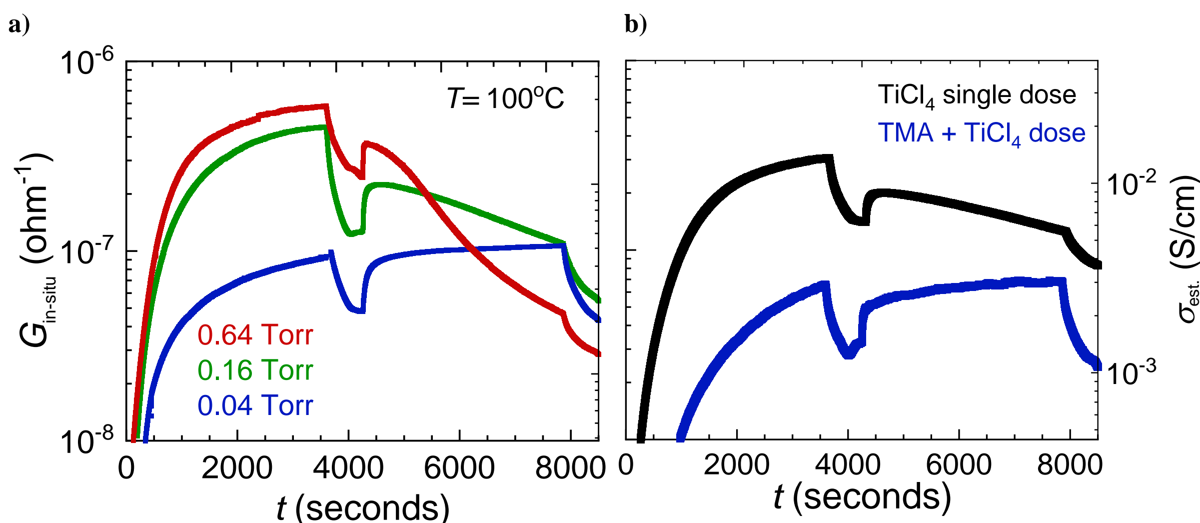

Figure 1 a) *In situ* conductance (S or Ω^{-1}) verse time (s) on a log-linear plot during VPI at 100°C for PAni substrate with $TiCl_4$ precursor at pressures of 0.04 torr, 0.16 torr, and 0.64 torr. Estimated conductivities are on the right axis based on a film thickness of 50nm. b)) *In situ* conductance (S or Ω^{-1}) verse time (s) on a log-linear plot during VPI at 80°C for PAni substrate with $TiCl_4$ precursor at 0.16 torr with and without passivating TMA dose. Estimated conductivities are on the right axis based on a film thickness of 50nm.

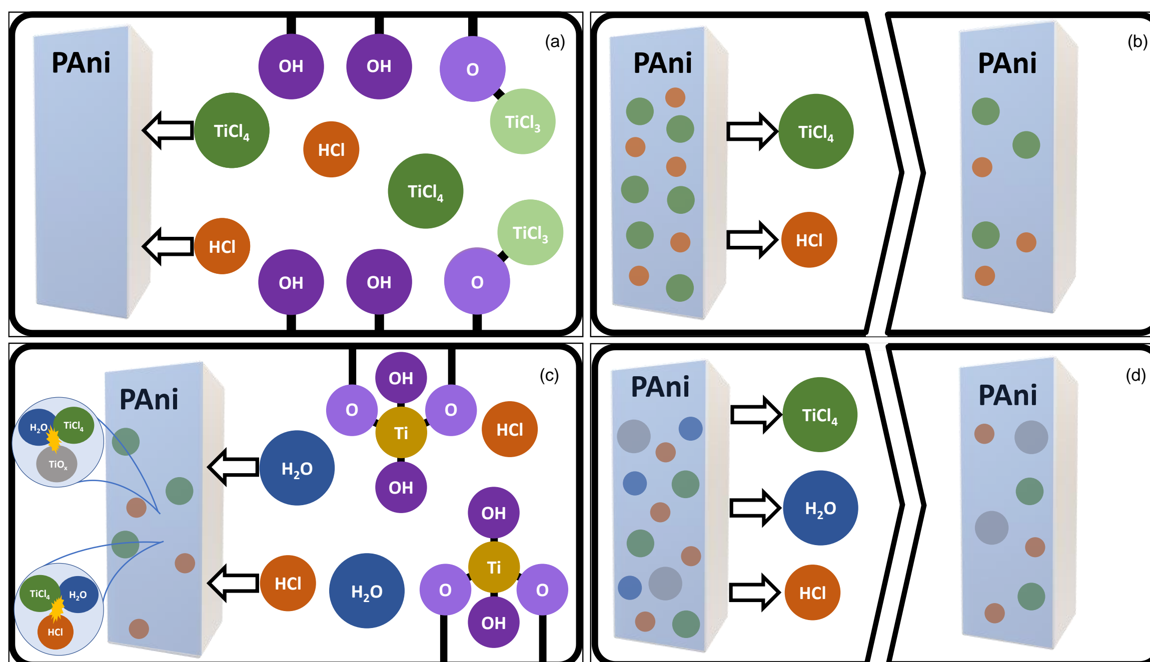

Figure 2 a) State of reactor with pristine PAni film as $TiCl_4$ is dosed into the reactor and reacts with hydroxyl groups forming HCl vapor. PAni is doped by both vapors b) PAni film after being doped with $TiCl_4$ and HCl during first purge-pump. Unentrapped $TiCl_4$ and HCl is removed. c) Reactor during H_2O dose where water vapor forms more HCl off hydroxyl groups and within the film and reacts with $TiCl_4$, forming oxide. d) $TiCl_4$, HCl, and H_2O removed from film during second purge-pump. Some oxide, $TiCl_4$ and HCl are left in the final film.