Structure and dynamics of a microphase separating block copolymer melt. AMISH PATEL, NITASH BALSARA, U. C. Berkeley, SURESH NARAYANAN, ALEC SANDY, Argonne National Laboratory, SIMON MOCHRIE, Yale University — A block copolymer melt is quenched from the disordered state to a temperature ($T_q$) below the order-to-disorder transition ($T_{ODT}$). The structure and dynamics of the melt is studied as a function of quench time using Small-Angle X-ray Scattering (SAXS) and X-ray Photon Correlation Spectroscopy (XPCS) respectively. For $T_q$ well below $T_{ODT}$, we observe that the broad SAXS peak corresponding to the disordered state transforms into a sharp peak indicating the formation of the ordered state. The ordering process is accompanied by an increase in the XPCS relaxation time. On the other hand, for $T_q$ close to $T_{ODT}$, the static structure factor remains unchanged and the melt remains disordered. However, even though the structure remains unchanged, the XPCS relaxation time increases and then reaches a plateau. Finally, we have shown that microphase separation can be stimulated in the above case of $T_q$ close to $T_{ODT}$. In order to do so, the melt is first taken to a temperature, $T' < T_q$, where microphase separation would eventually occur. After holding the melt at $T'$ for a short period of time, it is taken to $T_q$. At this time the melt is still disordered. However, in contrast to a direct quench to $T_q$, this procedure eventually results to the formation of a microphase-separated state.