Abstract—The talk will present the synthesis and characterization of a new class of hybrid amphiphilic system between an electrolyte polyacrylic acid (PAA) synthetic segment, and a hydrophobic beta-sheet forming peptide segment, poly(L-valine) (PLVAL). The synthesis of monodispersed copolymers (Mw/Mn < 1.3) was achieved through a combination of atom transfer radical polymerization\textsuperscript{1}, click chemistry\textsuperscript{2}, and nickel-catalyzed ring opening of N-carboxy anhydrides\textsuperscript{3,4} (Figure 1). The click chemistry is demonstrated to be an excellent method for the intermediate \textsuperscript{\textit{x}}-amino functionalization step to afford macronitiators that are free from deactivating or interfering molecules with degree of functionality about 90%.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure1.png}
\caption{Synthesis Scheme of poly(acrylic acid)-block-poly(l-valine)}
\end{figure}

Light scattering and circular dichroism characterization of PAA\textsubscript{\textit{x}}-block-PLVAL\textsubscript{\textit{y}} (\textit{x}-\textit{y} of 80-100, 80-80, 80-60, and 40-100) show a correlation of the formation of spherical core-shell micelles to the ability of the peptide segment to form ordered beta-sheet structures. Generally, the beta sheet formation is stabilized by a low pH condition (low charge on PAA), higher Val/PAA ratio (less interference from PAA-Val hydrogen bondings), and degree of core shielding by PAA in the presence of disrupting agents, e.g. urea. At higher pH, the beta-sheet structure was also found to counteract the charge repulsions of PAA units, which allows the micelles to retain their overall size and shape.

\textsuperscript{1} Davis, Matyjaszewski, K. \textit{Macromolecules} 2000, 33, 4039.
\textsuperscript{4} Brzezinska, K.R; Deming, T.J. \textit{Macromol. Biosci.} 2004, 4, 566