Investigations of the electronic structure and composition of regioregular poly(3-hexylthiophene) (P3HT) and phenyl-C$_{61}$-butyric acid methyl ester (PCBM) based films using Near Edge X-Ray Absorption Fine Structure (NEXAFS) are presented. The measurements were performed at the U49/2-PGM2 beam line of BESSY II, Berlin recording TEY (total electron yield) and TFY (total fluorescence yield) data. Samples prepared by spin coating a mixture of P3HT dissolved in chloroform and PCBM dissolved in chlorobenzene onto ITO (indium tin oxide) coated glass slides were analyzed. Upon measuring the pure P3HT and PCBM, all reported excitations were observed, whereas the blended system is a weighted superposition of the related peaks. Analyzing the data we calculate the composition of the mixture. We also show angular dependent NEXAFS measurements of the P3HT/PCBM blend in order to measure the orientation and distribution of the P3HT polymer. Additionally, we show a new approach for organic solar cell application. BaTiO$_3$ nanoparticles were incorporated as nanodispersion into the donor-acceptor blend or the ferroelectric copolymer poly(vinylidene fluoride trifluoroethylene) (P(VDF-TrFE)) was spincoated as an ultrathin film below the blend.