Abstract

Poly(aryl ether ketone)s (PAEK) are high performance thermoplastics, which are chemically robust, semi-crystalline, and stable at high temperatures. Of the family of PAEKs, poly(ether ether ketone) (PEEK) is a well-known semi-crystalline thermoplastic widely used for electronics, energy, industrial, and medical applications due to its resistance to solvents, radiation, heat, and other environmental factors. The traditional PEEK is prepared from 4,4’-difluorobenzophenone (2) and disodium hydroquinone. However, a challenge is processability, since due to its highly crystalline nature, PEEK possesses very limited solubility. An approach to solve these issues is to pre-functionalize PEEK polymers synthesized by nucleophilic aromatic substitution from 3,5-difluorobenzophenone (1) and hydroquinone, which results in a pendant benzoyl group. By using varying ratios of 3,5-difluorobenzophenone (1) and 4,4’-difluorobenzophenone (2) the degree of crystallinity in the polymer can be tailored. Herein, a series of semi-crystalline PEEK analogues bearing functional groups on the pendant benzoyl moiety, were synthesized and characterized in order to investigate the effects of structural variances on the thermal and solubility behavior.