

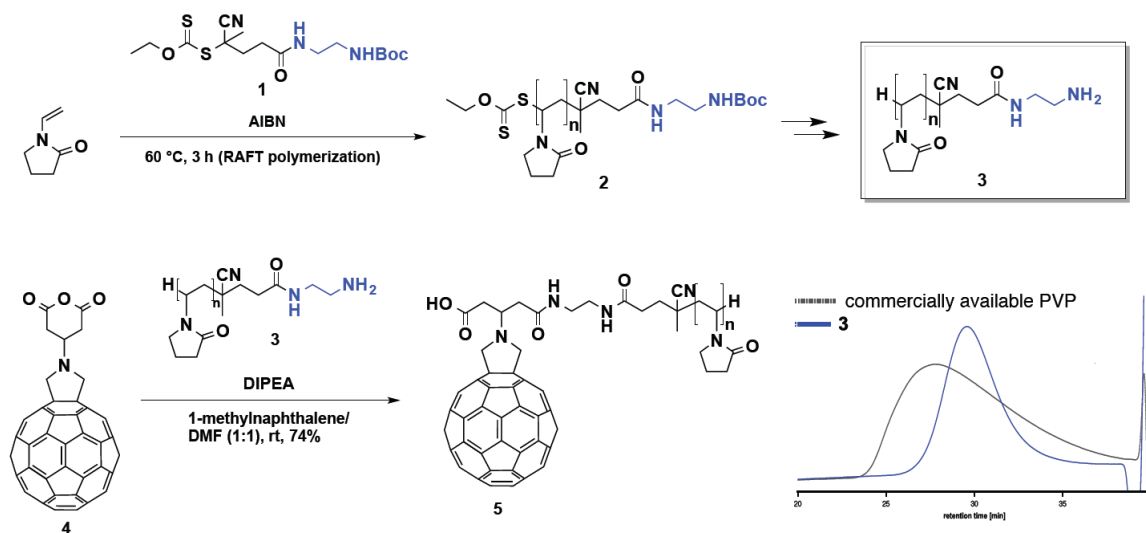
## Well-Defined Water-soluble Fullerene-PVP Conjugate for PDT Application

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The potential medical application of highly photosensitive fullerenes ( $C_{60}$  and  $C_{70}$ ) as photodynamic therapy (PDT) agents has been discussed for decades. Many methods to solubilize fullerenes in water or water-miscible solvents are being studied for the bioapplication of fullerenes. We have used a biocompatible and water-soluble polymer, poly(vinylpyrrolidone) (PVP), to prepare water-soluble  $C_{60}$ / or  $C_{70}$ /PVP complexes<sup>1</sup> and  $C_{60}$ - or  $C_{70}$ -PVP conjugates<sup>2, 3</sup> which can generate reactive oxygen species (ROSs) under visible light in high quantum yields.<sup>4,5</sup>

For clinical use, well-defined compounds with narrower molecular weight distribution are generally favored. In this study, we designed a RAFT reagent **1** for the preparation of well-defined PVP. Controlled polymerization of NVP in the presence of **1** successfully provided PVP **2**. The terminal moiety of **2** was converted to an amine **3** with molecular weight of around 20 kDa and a PDI of 1.29, which was available for the conjugation to  $C_{60}$  acid anhydride derivative **4**.<sup>6</sup> Obtained  $C_{60}$ -PVP conjugate showed a narrow molecular distribution (PDI = 1.31) with high water-solubility and ROS generation under visible light irradiation.<sup>7</sup>



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