Functionalization of harmonic nanoparticles for targeted tumor imaging and multimodal cancer diagnosis

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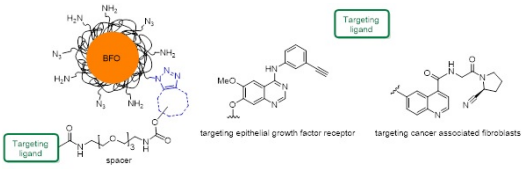
The recent and rapid progress in nanotechnologies has paved the way for the investigation of nanomaterials in clinical settings for early detection, diagnosis and targeted treatment of cancer, which represents a major health burden in developed countries.[1] The ability to produce inorganic nanoparticles of tunable size and composition, combined with their surface properties suitable for chemical functionalization have generated intense efforts to develop novel theranostic tools based on multifunctional nanomaterials.[2]

In this work, we present the synthesis of an Erlotinib analogue as targeting ligand for epithelial growth factor receptor (EGFR) which is an important prognosis biomarker for breast cancer. This compound was evaluated for its selective association to cancer cells and was further conjugated to poly(ethylene glycol) coated bismuth ferrite (BiFeO3, BFO) nanoparticles (NPs) through click reaction.[3] Development of a synthetic pathway for fibroblast activation protein α inhibitors suitable for post-conjugation to coated imaging harmonic NPs is currently investigated for targeting the tumor microenvironment.



Taking advantage of the second harmonic generation properties of the BFO NPs, the resulting nanomaterials were evaluated for their ability for cancer cells and tissue imaging by multiphoton microscopy.

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