Editorial

Multifunctional nanoprobe for photoacoustic imaging-guided cancer theranostics

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Cancer including lung cancer, rectal and prostate cancer, colon cancer and breast cancer remains the leading cause of morbidity and mortality worldwide. The use of noninvasive imaging technique to detect cancers at an early stage and achieve image-guided cancer therapy provides better opportunities for patients to obtain effective treatment with fewer side effects. To date, photoacoustic (PA) imaging (PAI) is the fastest-growing area of biomedical imaging technology because PAI enables anatomical, functional and metabolic imaging of tumors with high resolution, high contrast and satisfactory penetration depth. However, the sensitivity of PAI to visualize tumors is determined by its endogenous contrast. By contrast, multifunctional nanoprobe have exhibited their potentials as theranostic agents for PAI-guided cancer theranostics.

Interestingly, different multifunctional nanoprobe including inorganic and organic nanoparticles have been developed to improve PAI contrast and

enhance cancer efficacy. The inorganic nanoprobe consist of the metal nanoparticles such as the Au and Pd, transition metal dichalcogenides such as the MoS₂, WS₂ nanosheets and CuS₂ nanoparticles, and carbon nanomaterials such as graphene and carbon nanotubes. In addition to inorganic nanoprobe, organic nanoparticles such as BDT-IID based conjugated polymer dots (Pdots) can also serve as multifunctional nanoprobe for enhanced PAI-guided cancer theranostics.

This special issue highlights the latest development of inorganic and organic nanoparticles that range from design of multifunctional nanoparticles to PAI and PAI-guided cancer theranostics. The topics for this special issue include but are not limited to:

- (1) Development of multifunctional nanoparticles for PAI and PA-based multimodal imaging for cancer detection.

- (2) Development of organic/inorganic nanoprobe for PAI-guided cancer treatment such as phototherapy and immunotherapy.
- (3) Development of multifunctional nanoprobe for PAI-guided drug/gene delivery and tumor microenvironments monitoring.

It is expected that the selected original and review works from this issue can promote the development

of multifunctional PA probes for cancer detection and treatment.

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