Near-Infrared Absorbing Conjugated Polymer Nanoparticles for Photoacoustic Imaging

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Conjugated Polymers (CP) are a class of semiconducting nanostructures with an extensive backbone of alternating single-multiple bonds. The delocalized π-electrons provide unique optoelectronic properties.[1] CPs are emerging materials for electronic, energy and biological applications.[2]

Photoacoustic imaging is a non-invasive imaging technique with high spatial resolution images and deep-tissue penetration. The principles of photoacoustic imaging are based on the irradiation by pulsed laser light and the excitation of an endogenous or exogenous chromophore contrast agent. At the decay, an ultrasound is generated, resulting thermoelastic expansion and cellular death of the pathological cells by photothermal.[3]

The field of our interest includes the design and synthesis of new improved conjugated polymer nanoparticles that would be applied as photoacoustic imaging probes. In this presentation, we are representing our current study about conjugated polymers consisting of electron donating-electron withdrawing system (D-A) building blocks. We investigated the importance of the average molecular weight and the type of substituent by synthesizing and characterizing the following polymers and their corresponding nanoparticles encapsulated in an FDA-approved amphiphilic polymer (PEG-PLGA).[4] Then, the absorption and photoacoustic signal of the nanoparticles were measured, giving encouraging result as potential photoacoustic bioimaging agents.

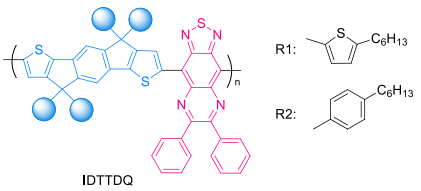

Figure 1:
Synthesis of thiophene- and phenyl-substituted IDTTG through a Stille reaction.

References:

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