Abstract:
Cancer is a class of diseases in which a group of cells display uncontrolled growth. Every year, about 562,340 Americans are expected to die of cancer, more than 1,500 people a day. Cancer is the second most common cause of death in the US, exceeded only by heart disease. In the US, cancer accounts for nearly 1 of every 4 deaths. Early detection and effective treatment are the best hope for cancer patients. Photodynamic therapy (PDT) and photothermal therapy (PTT) are promising modalities for cancer treatment. However, the difficulty of light penetration into deep tissue has hitherto prevented the application of photodynamic therapy for deep cancer treatment. The three components that are required for PDT are oxygen, photosensitizers, and light. To solve the problem of light penetration and to enhance the PDT treatment for deep cancers, here we introduce a new PDT system in which the light is provided by afterglow nanoparticles with attached photosensitizers. When the nanoparticle-photosensitizer conjugates are targeted to tumor and stimulated by X-ray during radiotherapy, the particles will generate light to activate the photosensitizers for photodynamic therapy. Therefore, the radiation and photodynamic therapies are combined and occur simultaneously, and the tumor destruction will be more efficient. More importantly, it can be used for deep tumor treatment as X-ray can penetrate deep into the tissue such as Breast and prostate cancers. This novel modality is called nanoparticle self-lighting photodynamic therapy (NSLPDT). In this presentation, we report the progress of the research in my group on the design, synthesis and evaluation of nanoparticle conjugates for photodynamic therapy as well as the strategies for drug delivery and targeting of nanomedicine to cancer cells for better outcomes.

Bio:
Dr. Wei Chen joined UTA Physics in 2006. In 2011, he was promoted to an associate professor and 2013 he was promoted to a full professor. Dr. Chen serves as the director for the SAVANT center and the editor-in-chief for Reviews in Nanoscience and Nanotechnology published by American Scientific Publishers.