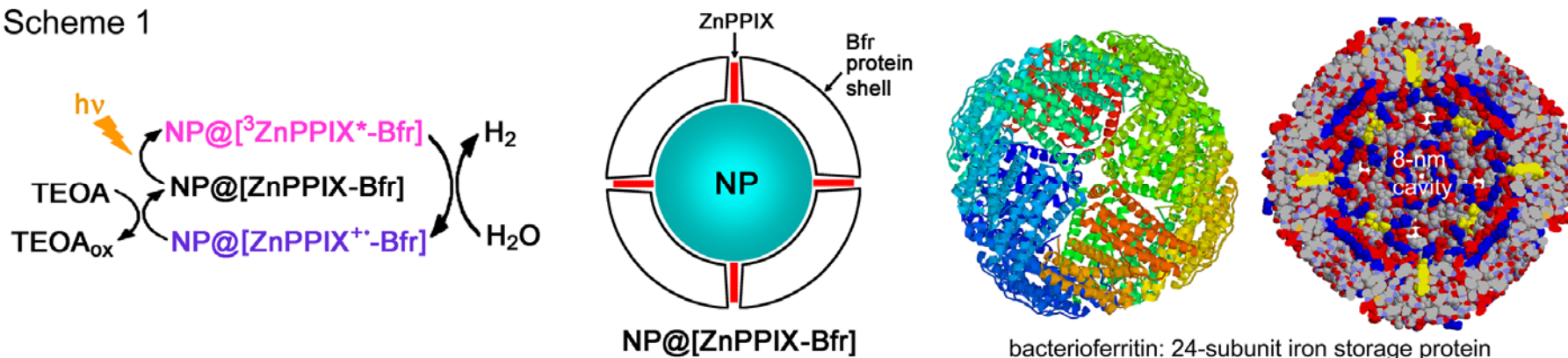


A Protein Scaffold Approach to Photochemical H₂ Production

Donald M. Kurtz, Jr., Department of Chemistry, University of Texas at San Antonio,
San Antonio, TX 78249

The goals of this research are to: i) construct a protein scaffold surrounding a noble metal nanoparticle (NP) with multiple molecules of the photosensitizing heme analog, zinc protoporphyrin IX (ZnPPIX) embedded within the shell of the iron storage protein, bacterioferritin (Bfr), and ii) use this construct to photo-drive reduction of H⁺ to H₂ in the presence of sacrificial electron donor, such as triethanolamine (TEOA), shown in Scheme 1.

Scheme 1



During the two-year grant period, we succeeded in replacing the twelve native hemes in Bfr with ZnPPIX to create ZnPPIX-Bfr. We demonstrated that the ZnPPIX can photocatalyze reduction of methyl viologen in the presence of TEOA. We also succeeded in incorporating 3- to 5-nm platinum NPs into the ZnPPIX-Bfr to create Pt NP@[ZnPPIX-Bfr]. This incorporation was confirmed by transmission electron microscopy. We are in the process of testing this construct for photochemical generation of H₂ using gas chromatography.