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Exploring dynamic structures of bionanocages by SRCD

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Given the vast array of natural synthesized proteins, the degree of folding, mechanism, location of assembly and size of the protein varies greatly. Amid this multitude of proteins, the ferritin family of proteins, considered bionanocages can be classified by size. The DNA-binding proteins from starved cells (DPS) are under 10 nm in diameter and part of this family. These bionanocages are characterized by their globular shape with a hollow interior cavity. DPSs are involved in several metabolic pathways such as detoxification, iron sequestration, oxidative stress and radiation damage prevention. A specially interesting ability of the cavity is the possibility to, without bioengineering, synthesize different types of nanoparticles, forming specific metal cores. Another interesting possibility is the use of the hollow cavity as a drug delivery system. Given the wide array of biotechnology uses that DPS bionanocages can achieve, it is important to have an understanding of the hollow cavity dynamic interactions during synthesis of different compounds. In order to gain a deep insight into the dynamics of the denaturation of DPS, Synchrotron Radiation Circular Dichroism (SRCD) measurements were performed at ASTRID2, Aarhus University. This allowed the assessment of melting temperatures and secondary structure features providing insights on cage assembly/disassembly. This information clarifies potential ways on how one can control the bionanocage for biotechnological applications.

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