

# Thermoresponsive protein like nanoparticles

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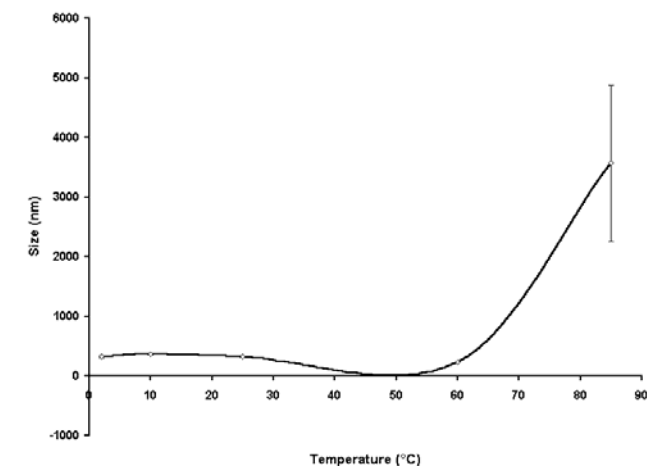
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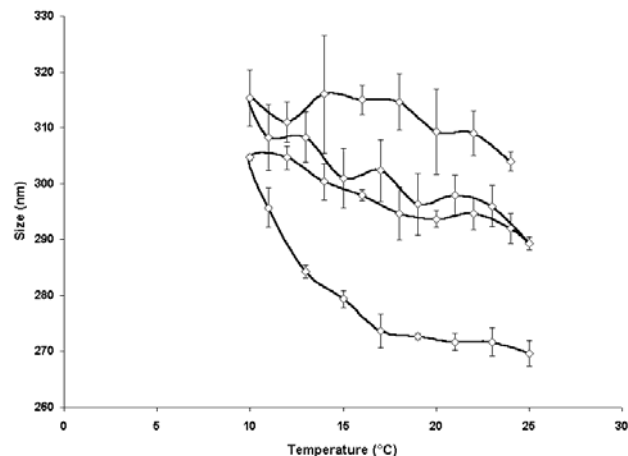
**Statement of Purpose:** The growing interest in the development of “protein like polymers” has explored the utility of amphiphilic polymers<sup>1</sup>. For that hydrophobic Diclofenac Sodium (DIC) was covalently immobilized into the large molecular weight poly vinyl alcohol (PVA).

**Methods:** The pendant polymer was prepared by condensation reaction using thionyl chloride and pyridine in DMSO at higher temperatures with slight modification of our earlier procedure<sup>2</sup>. A commercial Differential Light Scattering (DLS) spectrophotometer (nano ZS Red Badge, Model No: ZEN 3600, Malvern) was used for size analysis. Scanning electron microscopy (SEM) was done using Hitachi S 2400, after suspending the nanoparticles over a filter paper.

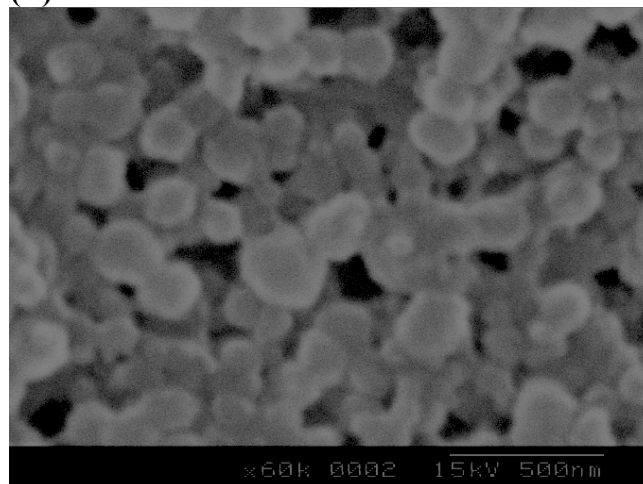
**Results/Discussion:** The nanoparticles are showing (Figure-1A) denaturation temperature(DT) at 60°C. Below the DT the nanoparticles are showing shape memory effect during thermal cycling (Figure-1B), which is lost during multiple thermal cycling. The SEM shows monodisperse globular nanoparticles of 250nm (Figure-1C). Previously such attempts were made out of amphiphilic polymers<sup>2</sup>. Our result shows that hydrophobic interactions is the driving force for the self-assembly and it could be used as an important bottom up approach to synthesize such nano-structures. Such approaches have wide applications in nanotechnology, photonics, signaling and imaging as well as in healthcare industry etc.



(A)



(B)



(C)

**Figure-1:** Denaturation temperature of the nanoparticles by DLS (A), Shape memory effect of the nanoparticles (B) SEM of nanoparticles (C).

**Conclusions:** Pendant polymers could be used for the synthesis of protein like nanoparticles. These nanoparticles show characteristic denaturation temperature and shape memory effect. Further we are planning to explore these nanoparticles for various applications.

## References:

- 1) Alvarez-Lorenzo, C.; *Macromolecules*, **2000**, *33*, 8693.
- 2) Kaladhar, K.; *Society for Biomaterials., Annual meeting: Biomaterials- The enabling Technology.* April 26- 29; **(2006)** Pittsburgh, PA, USA.