

Probing the Interactions of Intrinsically Disordered Proteins Using Nanoparticle Tags

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ABSTRACT

The structural plasticity of intrinsically disordered proteins serves as a rich area for scientific inquiry. Such proteins lack a fix three-dimensional structure but can interact with multiple partners through numerous weak bonds. Nevertheless, this intrinsic plasticity possesses a challenging hurdle in their characterization. We underpin the intermolecular interactions between neurofilament-low c-terminal domains, which are intrinsically disordered, in various hydrated conditions, using grafted gold nanoparticle (GNP) tags [1].

Leveraging plasmon resonance, we show direct visualization of ionic strength and specific cation dependence of GNPs grafted below saturation. At saturated grafting density GNPs exhibit well-defined inter-particle spacing which scales with salinity $d \sim c_s^\nu$, with ν in the range 0.07 – 0.08, virtually independent of cation choice between Li⁺, Na⁺, K⁺, Cs⁺. Beyond its biological significance, this approach can be applied to modify the surface interaction of GNPs for the creation of future tunable “smart” hybrid biomaterials.

[1] S. Pregent, A. Lichtenstein, R. Avinery, A. Laser-Azogui, F. Patolsky, R. Beck, Probing the interactions of intrinsically disordered proteins using nanoparticle tags. *Nano Letters* **15** (5), 3080-3087 (2015).

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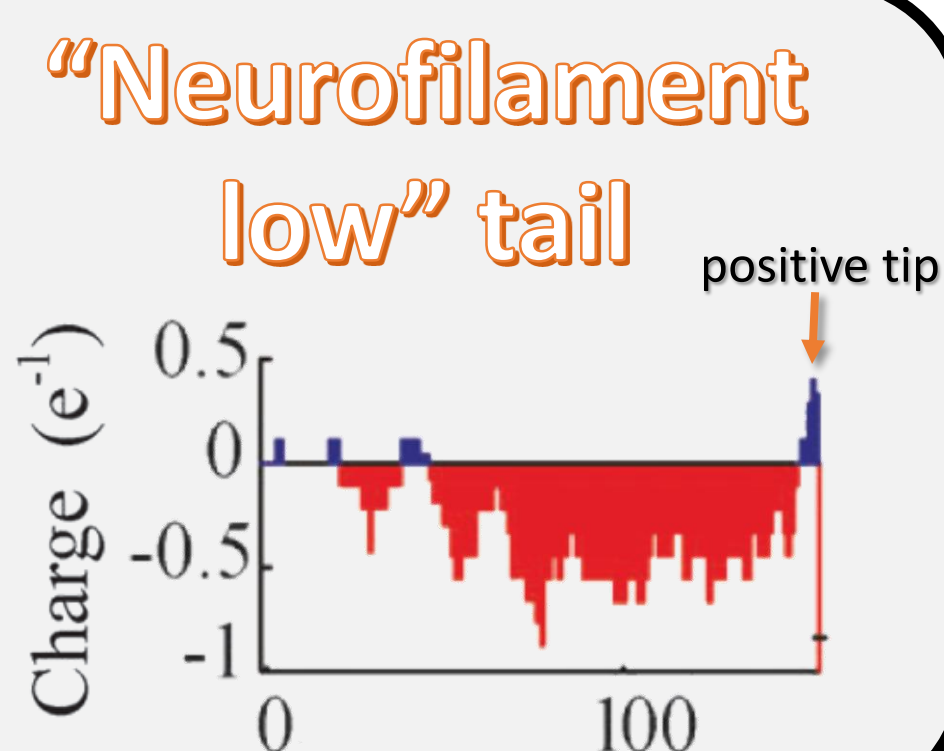
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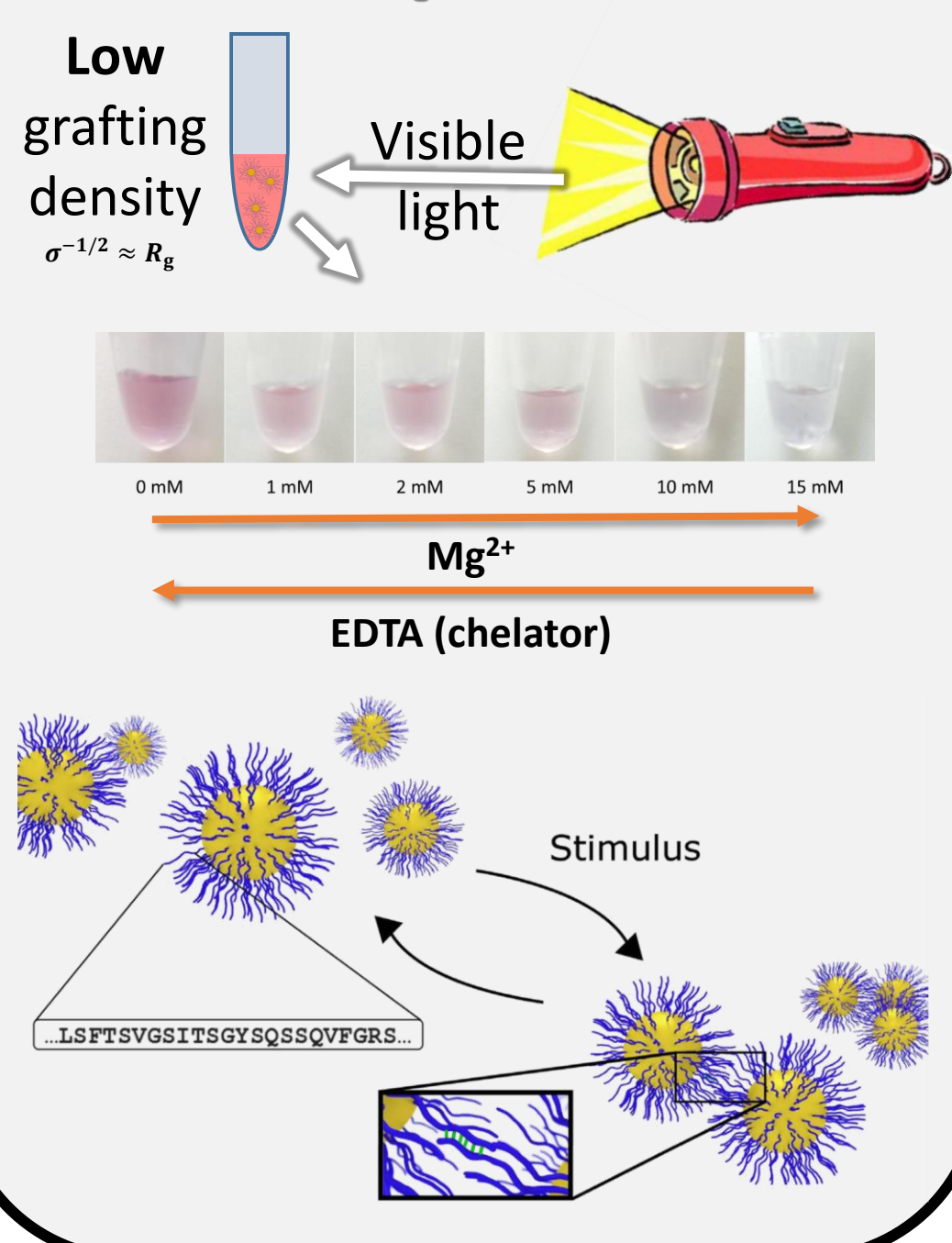
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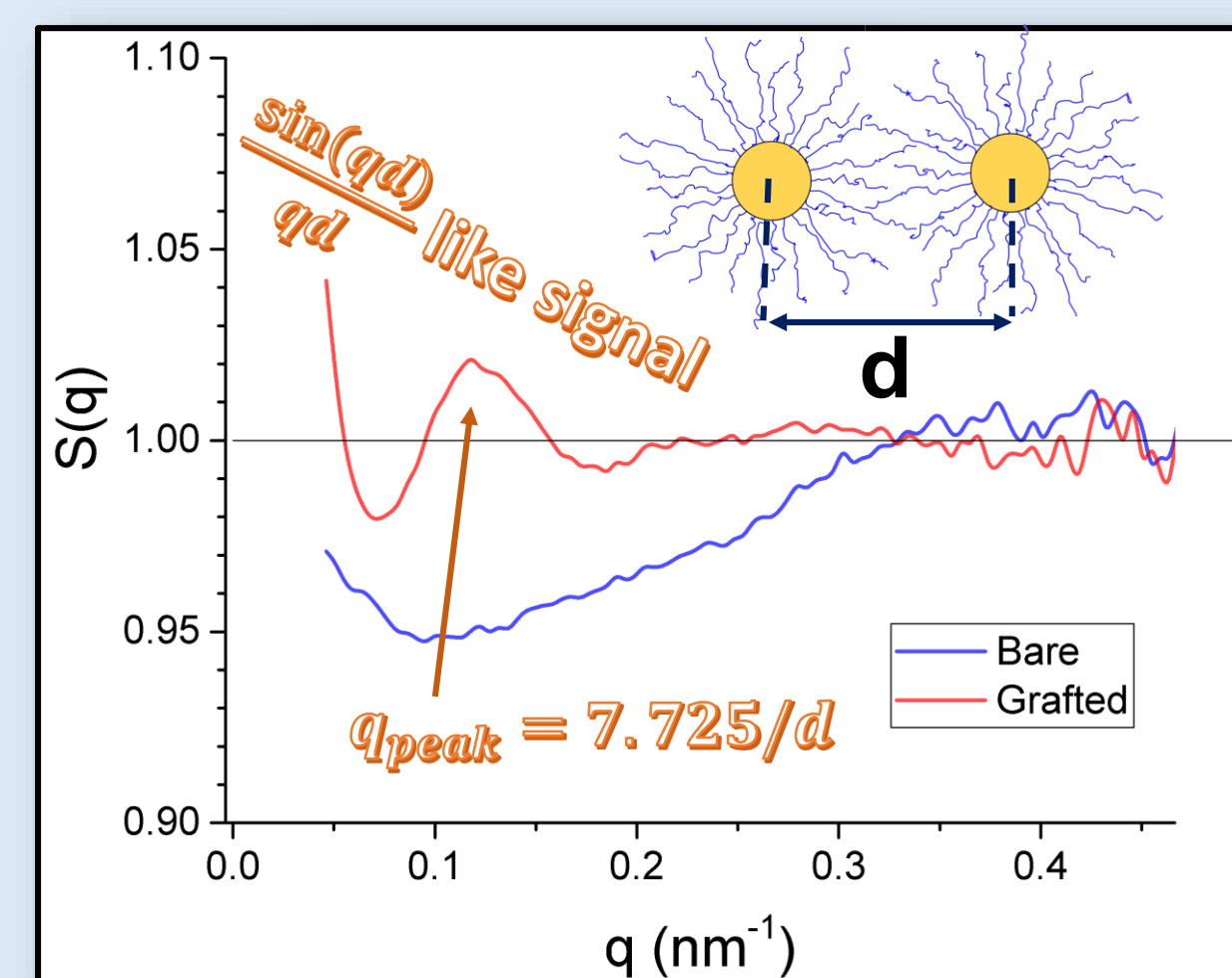
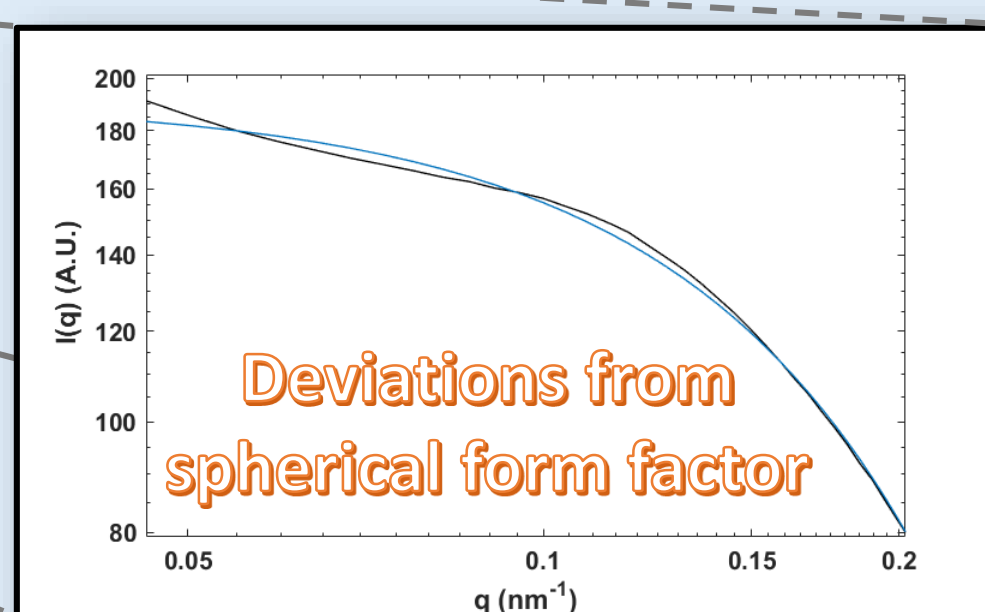
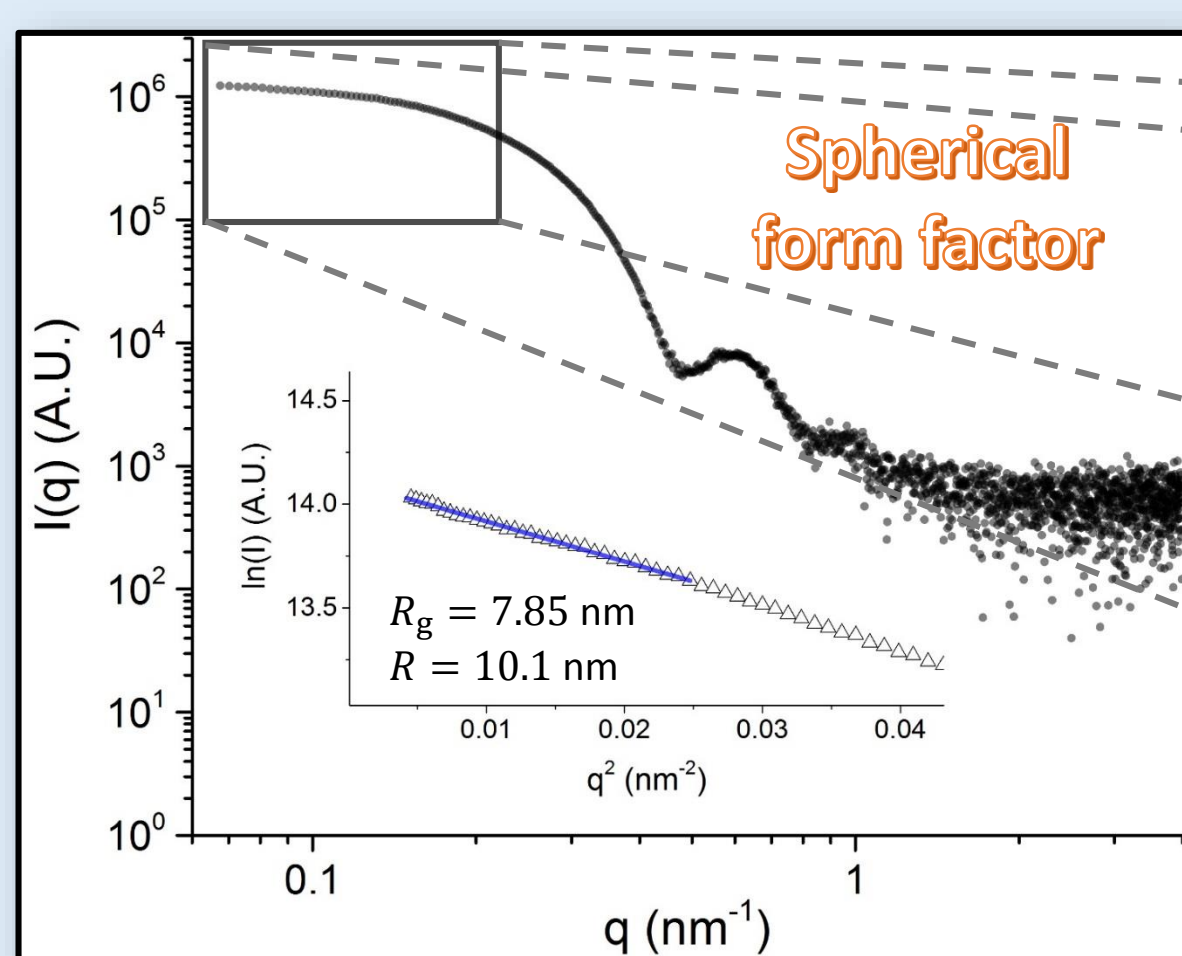
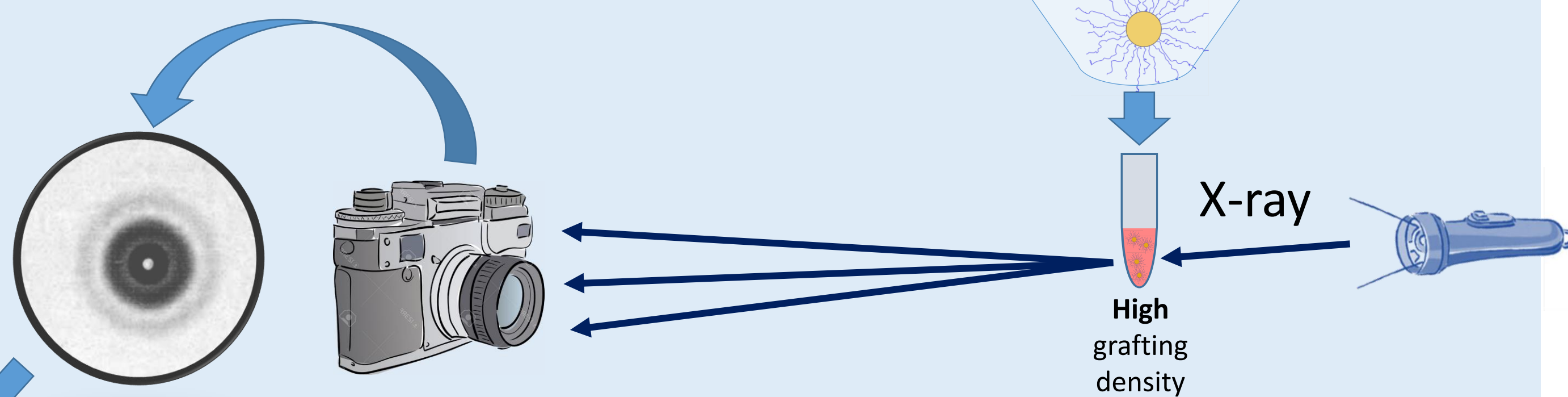
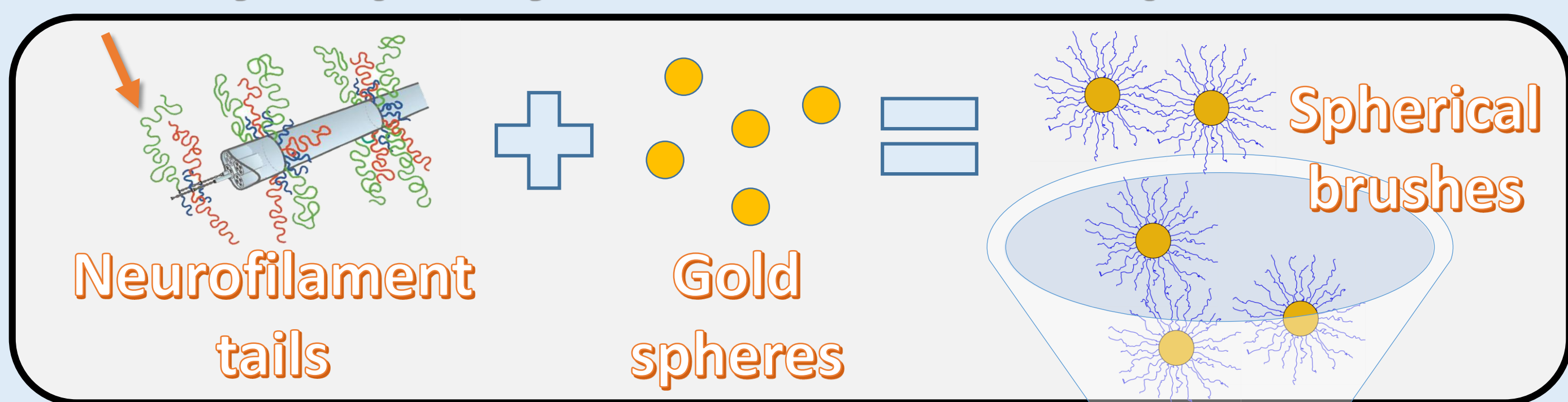
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Visible stimulus response



Polyampholyte brush – salt dependence

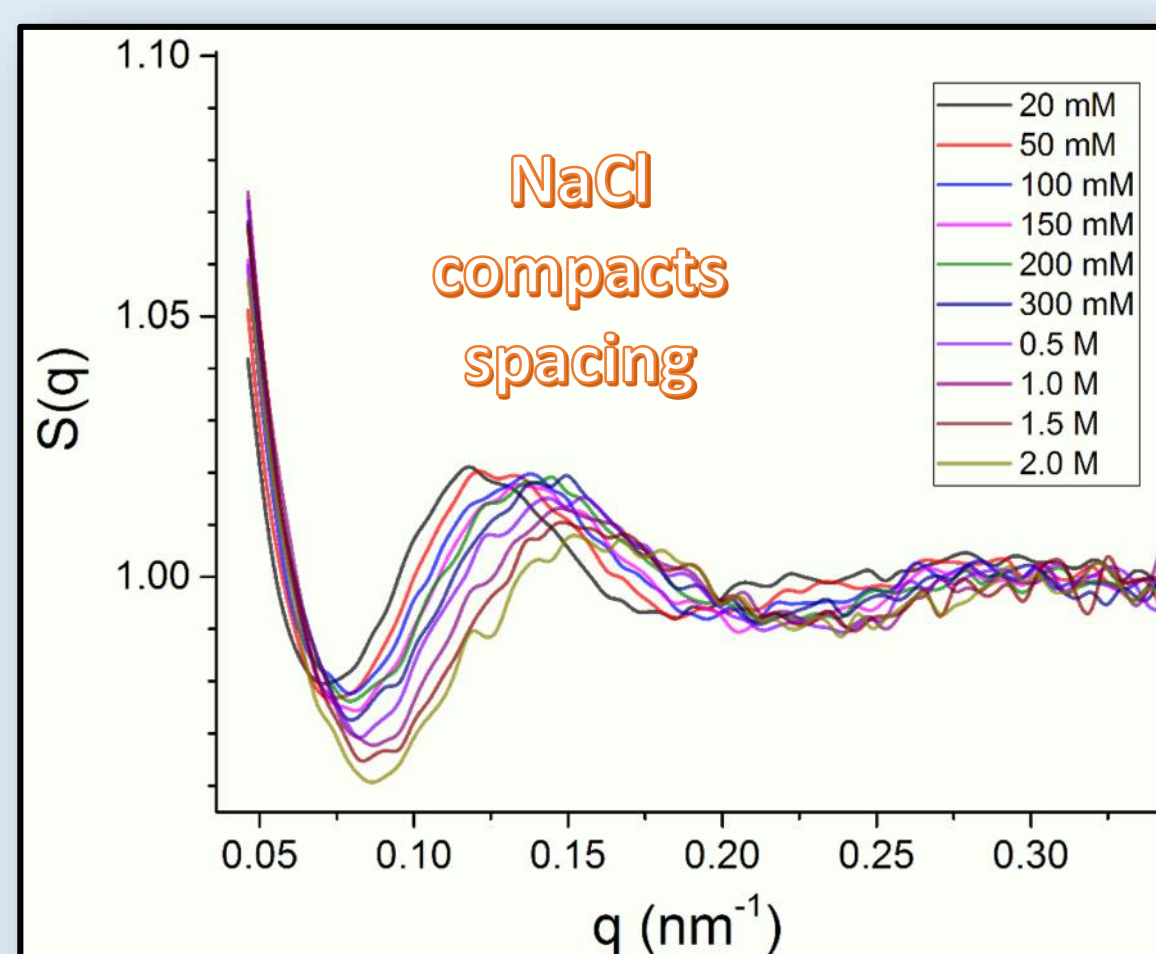


$$S(q) \sim I(q)/P(q)$$

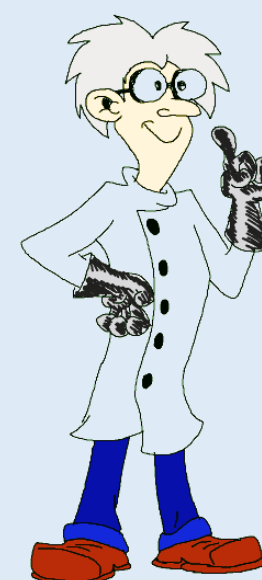
(Wikipedia: User:J.J.)



Let's put in some salt...



jerenberg.blogspot.co.il/2013/01/a-scientist-character.html



What about Li⁺, Na⁺, K⁺, Cs⁺?

