Propositions accompanying the dissertation

Development of nanoparticles based assays for the direct detection of unamplified nucleic acids in clinical specimens

1- Unmodified AuNPs can be used in the direct detection of unamplified HCV RNA from serum samples (Thesis).
2- Cationic AuNPs and magnetic nanoparticles can be employed for the detection of unamplified Hepatitis C Virus RNA from serum samples (Thesis).
3- The combination of AuNPs with magnetic nanoparticles improves the specificity of the AuNPs based nucleic acids assays (Thesis).
4- Nanoparticles based assays can directly detect unamplified nucleic acids in clinical specimens such as serum, urine and tissues (Thesis).
5- Cationic AuNPs are a novel tool for direct detection of unamplified HCV RNA in serum samples (Thesis).
6- Magnetic nanoparticles have wide applications in medicine such as MRI, targeted drug/gene delivery capability, rapid and efficient bio-molecules separation. In addition to their ease of synthesis and surface functionalization (Lee, J.H., *et al.* Nature medicine Med, 2007), (McCarthy, J.R., *et al.* Nanomedicine, 2007), (Hahn, Y.K., *et al.* Analytical Chemistry, 2007)
7- HURP and HRG are considered as emerging novel biomarkers for the early detection, diagnosis and prognosis of bladder and breast cancer respectively (Tsou *et al.* AACR Meeting Abstracts 2005, Jones, A. L. *et al.* Immunology & Cell Biology, 2005).
8- The tunable properties of AuNPs such as simple preparation, efficient numerous ligand conjugation, high absorption and scattering properties, make them a versatile platform for various detection strategies for different biomolecules, thereby expanding diagnostic possibilities. Moreover, AuNPs exhibit higher molecular extinction coefficient than the conventional dyes (Huang *et al.* Nanomedicine (Lond),2007, Liu *et al.* Colloids Surf B Biointerfaces, 2007).
9- Early effective detection is a cornerstone of disease management and control, be it infectious or a malignancy.
10- Making detection assays more accessible to the population, by being simple, sensitive, specific and cost effective, should be a central focus in any assay development.
11- Nanotechnology as an emerging diagnostic tool could compete with the currently used molecular assays. It not only opens up new diagnostic arenas, but it also has the potential to combine imaging and targeted therapy for various diseases.

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Rotterdam, 28 October 2014