Micromotor-based aptassays for neonatal sepsis diagnosis

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Diagnosis of neonatal sepsis is very challenging especially in very low birth weight infants, having so small blood volume and given their increased vulnerability to infection due to the immature immune system. That is why ICU care for these patients is more expensive to save the incipient life [1].

Micromotors (MM) represent one of the most exciting horizons in micro and nanotechnologies. The utilization of self-propelled micromotors in (bio)-chemical assays has led to a fundamentally new approach where their continuous movement around the sample and the mixing associated effect, greatly enhances the target-receptor contacts and hence the binding efficiency and sensitivity of the assay. Catalytic tubular micromotors are constituted by few microscale layers that confer them sensing/(bio)-functionalization capabilities (outer external layer, i.e., graphene oxide, GO), magnetic properties (internal layer, i.e., Ni), and self-propulsion (catalytic layer, i.e., Pt) (**Figure 1**). These catalytic MM have demonstrated to be a powerful tool for (bio)sensing [2].

While catalytic MM covalently functionalized with antibodies have previously been used in the diagnosis of neonatal sepsis [3-5], here we also explore the possibilities of aptamers on board on MM technology for this type of diagnosis, due to their high stability. They can also be produced by chemical synthesis and are therefore less expensive to manufacture, have less variability between batches and very controlled post-production modification all without losing its selectivity and sensitivity.

In this Keynote, novel GO/Ni/Pt MM-based aptassays will be presented and their neonatal sepsis diagnosis capabilities will be discussed.

References

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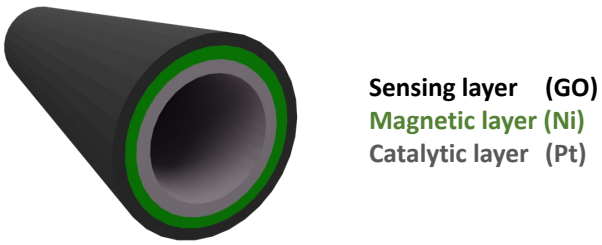

Figure 1: Schematics for layered catalytic tubular GO/Ni/Pt micromotors