There is a high demand to develop innovative and cost-effective devices with interest for health care
beside environment diagnostics, safety and security applications. The development of such devices
is strongly related to new materials and technologies being nanomaterials and nanotechnology of
special role. We study how new nanomaterials such as nanoparticles, graphene, nano/micromotors
can be integrated in simple sensors thanks to their advantageous properties. Beside plastic platforms
physical, chemical and mechanical properties of cellulose in both micro and nanofiber-based
networks combined with their abundance in nature or easy to prepare and control procedures are
making these materials of great interest while looking for cost-efficient and green alternatives for
device production technologies. Both paper and nanopaper-based biosensors are emerging as a new
class of devices with the objective to fulfill the “World Health Organization” requisites to be
ASSURED: affordable, sensitive, specific, user-friendly, rapid and robust, equipment free and
deliverable to end-users. How to design simple paper-based biosensor architectures? How to tune
their analytical performance upon demand? How one can couple nanomaterials such as metallic
nanoparticles, quantum dots and even graphene with paper and what is the benefit? How we can
make these devices more robust, sensitive and with multiplexing capabilities? Can we bring these
low cost and efficient devices to places with low resources, extreme conditions or even at our homes?
Which are the perspectives to link these simple platforms and detection technologies with mobile
communication? I will try to give responses to these questions through various interesting
applications related to protein, DNA and even contaminants detection all of extreme importance for
diagnostics, nanotheranostics, environment control, safety and security.

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