

# Summary report



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16 September Summary Report Nanotechnologies are becoming more popular. The applications of nanotechnologies are numerous. The pace of nanotechnology development is so fast, that it is difficult to predict where nanotechnologies will be used tomorrow. The current research provides a wealth of information about what nanotechnologies are, how they work, and how they can be used to enhance the efficiency of various manufacturing processes. In brief, the most important research findings can be summarized as follows.

Dr. Lvov's presentation provides the detailed overview of smart nanocontainers, from nanocapsules to clay nanotubes. During the period between 1993 and 2010, Dr. Lvov has published more than 70 papers on layer-by-layer assembly. Nano-assembly on microtemplates and nanocapsules are described. The most interesting, however, are the potential applications of halloysite, as described by Lvov: these include delivery of herbicides, fungicides, and insecticides, anticorrosion agents for protective coating, plastic fillers and drug sustained release, hydrogen storage and even catalytic materials (Lvov). This information is followed by empirical research findings.

Some authors concentrate on the analysis of nanoparticles use in medicine. Zheng et al discuss the benefits of layer-by-layer encapsulation for the poorly water-soluble anticancer drugs (7679). In this study, the researchers mixed curcumin with an organic solvent miscible with water, obtained curcumin crystals of 60-100 nm size via ultrasonication, and coated them with the help of biocompatible polyelectrolytes (Zheng et al 7679). The use of layer-by-layer encapsulation proved to be effective in sustained drug release from nanoparticles (Zheng et al 7679).

Franz et al followed the similar pattern and explored nano self-assembly coating of *A. vinosum*, to gain better knowledge of substrate uptake in bacteria (164). The authors found out that the coated cells surface charge does not affect sulfide uptake: obviously, defining the surface properties of bacteria has far-reaching implications for microbiological and biotechnological applications (Franz et al. 167). In a similar vein, Shutava et al prove that layer-by-layer techniques can be successfully utilized, to help the encapsulated anticancer drug material to retain its biological activity and block hypatocyte growth factor (1877). Layer-by-layer techniques can also involve the use of tubular halloysite clay, to ensure the sustained release of drug loaded halloysite tubes (Veerbadran et al. 100). In this context, Abdullayev et al. use a completely different approach and study halloysite tubes and their utility for anticorrosive performance (1437). Although the current research provides extensive information about nanotechnologies, many years will pass before the society possesses sufficient knowledge of nanoparticles and their use in various fields of manufacturing.

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