CONSTRUCTION OF BIONANOPARTICLES WITH THE USE OF RECOMBINANT DNA VECTOR-ENZYMATIC SYSTEM CONTAINING ARTIFICIAL POLIEPITOPIC PROTEINS FOR DELIVERY OF NEW GENERATION VACCINES.

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DNA/RNA amplification technologies, such as the *Polymerase Chain Reaction* have revolutionized modern biology, medical diagnostics and forensic analyses, among others. A number of alternative nucleic acids amplification methods have been developed, tailored to specific applications. Here we present a refined version of a DNA fragment amplification technology, which enables the construction of ordered concatemers in a head-to-tail-orientation. A very high number of DNA segments, at least 500 copies, can be consecutively linked. Other key features include: (i) the application of a dedicated vector-enzymatic system, including selected subtype IIS restriction endonucleases, which has been designed to automatically generate long Open Reading Frames and (ii) an amplification-expression vector with a built-in strong transcription promoter along with optimal translation initiation signals, which allow for a high level of expression of the constructed artificial poliepitopic protein. This highly advanced technology makes it possible to obtain ordered polymers of monomeric, synthetic or natural, DNA far beyond the capabilities of current chemical synthesis methods. The constructed poliepitopic proteins are further used for construction of several types of nanoparticles, including inclusion bodies and bacteriophages, containing multiple genetic fusion with poliepitopic proteins.The technology offers significant advances in a number of scientific, industrial and medical applications, including new vaccines and tissue pro-regenerative methods. The technology is protected by an international patent application and is available for licensing.

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