



granted a \$10.6 Million Federal Grant to the University of Arkansas for Medical Sciences to expand its proteomic resources. Similarly, in June 2022 British Columbia government invested and is managing large-scale genomics and proteomics research projects based on health, forestry, and agriculture among others. Thus, such funding initiatives are expected to boost the adoption of the proteomics and genomics in R&D and fuel the market growth during the forecast period.

Moreover, the surge in infectious diseases such as lower respiratory infections and human immunodeficiency virus (HIV), among others in recent years due to climate change, changing land-use patterns, and rapid urbanization are expected to aid in the market growth. For instance, according to WHO, lower respiratory infections ranked fourth place in causing deaths globally. In addition, in 2020, according to UNAIDS there were approximately 38.4 million people across the globe with HIV. Thus, the rise in infectious diseases require effective diagnosis and treatment options such as CFPE in the market. For instance, CFPE based system can be activated in less time by adding water. This feature helps in the portable diagnosis of infectious diseases. Therefore, rising infectious diseases can increase the applications of CFPS in treatment and diagnosis, and are likely to contribute to the market growth in the near future.

The development of vaccines and treatment was an emergency requirement globally to treat and combat the spread of COVID-19 infection. The low-cost, rapid manufacture and production of therapeutic antibodies were expected in the market. The conventional method of manufacturing antibodies relied on cell-based protein expression and this production required nine months or more. The CFPE-based vaccine production cut the time from a few months to one month or a few weeks. For instance, SwiftSacle Biologics, cell-free lysate-derived E. coli bacteria shrank the timeline of vaccine production from nine months to one month and turned out to be a game changer during the pandemic. Therefore, the CFPS advantages over traditional cell-based methods increased the applications of CFPS in the industries during COVID-19 and led to a boost in the market growth.

The increase in investments by various pharmaceuticals, biopharmaceutical companies is increasing the R&D activities of genomics & proteomics in drug development. For instance, Thermo Fisher Scientific invested in a spatial proteomics Ionpath firm to scale up the MIBIscope instruments and end-to-end spatial proteomics services to meet the increasing demand for services. In addition, in Jan 2022, Protai received funding of \$8 million to provide an AI-based proteomics platform. This effective approach improved the development process and accuracy of drug discovery by saving time and lowering the costs of R&D. Such R&D investments increased the adoption of proteomics and

genomics and are expected to contribute to the market growth.

On the other hand, Cell-free protein expression turns costly in the up scaled experiments due to the complexity of the cell-free lysates from the eukaryotic sources and the challenges in post-translational modifications of biomolecules due to misfolding or pleiotropic interactions with cellular components. The CFPE offers low protein production that can be used in small scale production and turns expensive for large scale production in industries. For instance, as per a research article published in the Journal of visualize experiments in Feb 2019, commercial CFPS kits, such as iPE-Quick Kit (Sigma-Aldrich) cost around USD 0.82 per microgram of protein, while Expressway (Thermo Fisher) costs about USD 0.76 per microgram of protein, excluding the cost of labor and equipment. Therefore, CFPE is expensive in large scale production and can impede the market growth.

### Cell-free Protein Expression Market Report Highlights

By product, the expression systems segment held the largest share of the cell-free protein expression market. E. coli lysates is one of the most preferred lysates commercially due to cost-effectiveness and higher protein yield

The wheat germ cell-free protein expression system segment is expected to grow lucratively over the forecast period. This system is a choice of preference for numerous applications in protein research comprising options for protein labeling and the expression of proteins such as multiple protein complexes and membrane proteins

By application, the enzyme engineering segment held a larger share of the global market. Enzyme engineering plays an important role in biomanufacturing synthetic biology, and medicine

The transcription & translation systems segment by method captured the highest revenue share of the market in 2021. Coupled transcription and translation (TNT) systems offer investigators time-saving options for eukaryotic in vitro transcription and translation, by connecting these processes in a single tube format

By end-user, the pharmaceutical & biotechnological companies segment held a larger share in 2021, owing to the expansion of the current manufacturing capacities coupled with increasing prevalence of chronic disease which in turn

demands for novel therapeutic drugs

North America dominated the global market in 2021 due to the growth in the biotechnology and pharmaceutical industry, presence of high research and development investment, and the development of novel cell-free protein engineering products in the region

The Asia Pacific is expected to grow considerably in the future increasing investments by major market players coupled with funding by the government for R&D

A few of the key market players include Thermo Fisher Scientific, Inc, Takara Bio Company, New England Biolabs, Merck KGaA and others

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