Protein Expression Systems Market: Current Landscape and Future Opportunities

Description:
Advances in genetic engineering and cloning techniques have allowed isolation and expression of heterologous and recombinant proteins for research, therapeutic and industrial uses. Large scale applications such as enzyme, antibody or vaccine production require high amounts of protein. This demands that the system producing protein must be easy to culture, allow rapid cell growth and provide good yield. Various expression systems based on the machinery of bacteria, yeast, insect or mammalian cells have been developed to cater to these demands.

Protein synthesis occurs differently in prokaryotic and eukaryotic systems; the need for post translational modifications adds a level of complexity in the latter case. Newer expression systems utilising yeast and insect cells as host are gaining momentum due to favourable culture conditions and final end products. Pichia and Sf9/Sf21 host cells have emerged as the most commonly used systems in these categories, respectively. Some plant based technologies express protein rapidly, unlike the traditional methods of production in transgenic plants. Several other expression systems based on protozoa and fungi have also demonstrated effective protein expression. In addition, cell free expression systems have also been developed and are gaining momentum in the market.

The highly lucrative biologics market presents a huge opportunity for such systems. Both large and small companies in this sector have developed proprietary recombinant protein expression techniques to carve out their own share of the multi-billion dollar market. The increasing demand for biologics has led to the involvement of various CMOs providing services in protein expression. However, there are some technical shortcomings in current platforms which need to be dealt with to maximize the available opportunity. The opportunity, overall, will continue to increase manifold with the approval of several new biologics and biosimilars in the coming few years.

The “Protein Expression Systems Market: Current Landscape and Future Opportunities” report provides an extensive study of the various expression systems commercially available for the purpose of expressing the desired proteins. Selecting an effective and reliable expression system is one of the pre-requisites for pharma companies before they start proof of concept studies for biological molecules. It is well known that a particular expression system is not suitable to express every kind of protein. As such, there are several different types of platforms available to meet the growing demand.

With an extensive pipeline of biologic drugs, protein expression systems are likely to continue to garner significant attention from the biopharmaceutical industry. The report covers various aspects such as key features of these systems, associated products, licensing and services portfolio. We have also covered specific details on CMOs manufacturing biopharmaceutical products highlighting their capabilities, geographical location, scale of operation, type of biologics being manufactured and expression systems being used.

In addition, the report highlights the future growth prospects with respect to manufacturing biological molecules. The report has analyzed the overall biologics pipeline and provided specific details on some important classes such as antibody drug conjugates (ADCs) and bispecific antibodies. In addition, the emerging opportunity presented by the ongoing development of biosimilars has been highlighted. For the purposes of the study, important stakeholders were interviewed to solicit their opinions around the upcoming opportunities and challenges which must be considered for a more inclusive growth. Examples of companies interviewed include Research Corporation Technologies, iBio and Jena Bioscience.

Sample Highlights
- Presently bacterial and mammalian cell based systems are the preferred choice for therapeutic protein expression. Bacterial systems are preferred for their low cost, high productivity and rapid results. Mammalian cells, on the other hand, have the ability to generate proteins with folding and post-translational modification identical to native endogenous protein.

- A number of new host systems have come into the market offering advantages such as higher protein yield, diminishing susceptibility to viral contamination and easy scale up. Among these are yeast, insect, and
also certain plant based protein expression systems. Cell free systems have also gained momentum and allow direct manipulation of the chemical environment that rapidly generates significant amounts of the required protein.

- In addition to the well-established firms such as Agilent Technologies, Clontech, Life Technologies, Lonza, Merck Millipore, Promega Corporation and Research Corporation Technologies, several smaller companies too have developed robust proprietary expression systems. Examples (in alphabetic order) include Dyadic International, Geneva Biotech, Greenovation, iBio, Jena Bioscience, New England Biolabs, Oxford Expression Technologies, Pfenex and Scarab Genomics.

- The highly lucrative biologics market presents a huge opportunity for protein expression systems. The biologics market is considered to be worth over USD 200 billion and has an increasing number of therapeutically relevant protein based molecules in the pipeline.

- The outlook for CMOs is highly promising. The study identified over 160 biopharmaceutical CMOs (accounting for over 250 production facilities worldwide), which provide protein expression services. With around 900 biologics in the pipeline and 150 marketed products, CMOs stand to benefit tremendously from this growing trend.

- Technological improvements including the use of highly evolved expression elements such as designer promoters for obtaining higher translational efficiency, genome engineering to facilitate better homologous recombination and computer-controlled feeding algorithms are likely to further maximize output and yield.

Research Methodology:

Most of the data presented in this report has been gathered via secondary and primary research. For all projects, interviews are conducted with experts in the area (academia, industry, medical practice and other associations) to solicit their opinions on emerging trends in the market. This is primarily useful to draw out opinion on how the market will evolve across different regions and technology segments. Where possible, the available data has been checked for accuracy from multiple sources of information.

Chapter Outlines:

Chapter 2 provides an executive summary of the insights captured during the research. The summary offers a high level view on the present scenario of protein expression systems market and the likely growth opportunities in the future.

Chapter 3 provides a general introduction to protein expression systems. The basic concepts related to protein synthesis and recombinant protein expression in such systems have been briefly discussed. The chapter also covers an overview on different types of expression systems that are used for expressing protein along with their advantages and disadvantages.

Chapter 4 presents a comprehensive list of expression systems, categorized based on the host cell in which the protein is expressed. In addition, it also lists the expression systems being developed by various academic institutes.

Chapter 5 provides additional details on some expression systems which are relatively more popular within each specific category. Each profile highlights the key attributes such as yield, time to express protein, quality of product, associated cost, scale-up and culture requirements.
Chapter 6 presents profiles of 12 leading companies in this domain. Each company profile includes information such as company overview, financial performance, expression systems, product portfolio and licensing and partnership agreements made with other companies.

Chapter 7 elaborates on the participation of contract manufacturers in biopharmaceuticals manufacturing. This chapter includes an extensive analysis of CMOs and highlights their geographical location, manufacturing capabilities in terms of type of biologics manufactured and scale of operation, expression systems used and fermentation capacity.

Chapter 8 focuses on highlighting the opportunity areas for companies with proprietary expression systems. It provides a detailed overview on biologics currently being developed and specifically covers the pipeline of some of the important drug classes such as antibody drug conjugates and bispecific antibodies. We have also highlighted the opportunity presented by biosimilars, a key growth prospect for developers of expression systems.

Chapter 9 provides analysis of the strengths, weaknesses, opportunities and threats in the protein expression systems market. This section captures key elements likely to influence future growth in the industry.

Chapter 10 summarizes the overall report. This chapter provides a recap of the key takeaways and independent opinion based on the research and analysis described in previous chapters.

Chapter 11 provides three interview transcripts based on discussions with senior stakeholders in the industry. The companies interviewed included Research Corporation Technologies, iBio and Jena Bioscience.

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