Role of Graphene and AI for A Step Towards Development

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***Abstract*— Graphene is a revolutionary technology that can potentially expand markets and displace current production methods. This research is a descriptive paper investigating whether Graphene can solve every issue our nation faces. This paper seeks to understand the history of Graphene and how it relates to artificial intelligence (AI). This study also explores whether or not India would experience disruption as a result of this connectivity. We also stress the significance of graphene research in India. Graphene has several applications, from energy solutions to degraded agricultural products. Switching to cleaner practices could be expensive, but the benefits would last a lifetime. India's economy is the eleventh strongest globally and ranks fourth in buying power. It is anticipated to enjoy enormous economic growth over the next ten years, and significant construction is underway. However, accessible non-renewable natural resources suffer because of these advances. Over the past ten years, graphene research has accelerated in India. However, the research has been primarily theoretical. In terms of actual application, we haven't advanced at all. We must realize that academic studies alone won't aid in the environment's sustainability; only the practical application will. Therefore, India and all other nations should begin utilizing Graphene in all practical applications.**

Keywords*— *Graphene, Carbon atoms, Artificial Intelligence, Indian Research,

I. Introduction

Researchers worldwide have directed their efforts towards addressing resource scarcity, emphasizing Graphene, a carbon allotrope characterized by a unique atomic arrangement that forms a nanostructure featuring a hexagonal lattice. The scientific community has been fully immersed in activities encompassing bulk production, valuation, and practical implementation of these ultrathin carbon films since 2004[1]. Graphene exhibits potential applications in the enhancement of battery longevity [2], the improvement of solar cell efficiency [3], corrosion mitigation [4], and circuit board development [5], as well as in the domains of display panel technology and medical advancements [2]. Due to the diverse uses and effectiveness of Graphene, different governments have developed a high level of interest in the compound. This paper was developed about twenty years ago when a related material called carbon nanotube was found to have versatility and capacity for use in different markets; thus, policymakers sought to explore its market potential. Nevertheless, although much was expected from carbon nanotubes at an early age, these materials never experienced widespread application. Therefore, there has been more focus on Graphene to evoke questions about the value of this product and its viability for implementation in governments' physical facilities. This raises questions about whether Graphene will surpass the fate of carbon nanotubes and successfully transition from research to practical applications.

Graphene garnered significant scientific interest following its discovery in 2007 by the University of Manchester. Serving as the cornerstone for all carbon polymorphs, Graphene distinguishes itself from other carbon structures [7]. Despite its composition as a two-dimensional arrangement of carbon atoms organized in a hexagonal lattice, Graphene exhibits remarkable malleability and can stretch substantially from its initial form. Notably, Graphene surpasses steel in strength while maintaining a lightweight characteristic akin to cotton.

The world is now concentrating on artificial intelligence (AI), a sub-discipline of machine learning that tries to mimic human intellect and thus improve human comfort. Business processes like quality assurance, customer service, fraud detection, and others can be automated using AI, which is why most companies have adopted AI, and there is a lot of enthusiasm for its utilization. For instance, it is for this reason that AI is regarded as flexible and has many advantages that cut across all industries. It increases the flow and accuracy in incidental and monotonous operations that are entailed in a day. As such, governments, businesses, and university institutions all focused the lion's share towards AI. Its development is now integral to global developmental strategies aimed at bolstering security measures and enhancing national competitiveness [8].

Graphene shows great potential in next-generation electronics because of its unique two-dimensional structure and characteristics, which include zero-gap band configurations, fast electron mobility, and high electrical and thermal conductivity [9]. For practical utilization of atom-

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