

# 2D Materials Market - A Global and Regional Analysis: Focus on End User, Material Type, and Region - Analysis and Forecast, 2022-2031

<https://marketpublishers.com/r/2D0981FBE57DEN.html>

Date: April 2023

Pages: 266

Price: US\$ 5,500.00 (Single User License)

ID: 2D0981FBE57DEN

## Abstracts

### Global 2D Materials Market: Industry Overview

The global 2D materials market is projected to reach \$4,000.0 million by 2031 from \$526.1 million in 2022, growing at a CAGR of 25.3% during the forecast period 2022-2031.

The demand for 2D materials is anticipated to grow with the increasing demand from the end-use industries such as composite and coatings, energy storage devices, electronics, semiconductors, pharmaceuticals, automobiles, and others. Furthermore, it is anticipated that during the projected period of 2022-2031, the increasing adoption of 2D materials in the healthcare industry and the increasing adoption of non-graphene 2D materials such as Mxene, TMDCs, Hexagonal boron nitride, and others are expected to further fuel the advancement of the global 2D materials market. However, the high cost of production is anticipated to hinder market growth in the upcoming future.

### Market Lifecycle Stage

The global 2D materials market is in the growth phase. Rising sales of fuel cell vehicles and increasing focus on decarbonization and controlling pollutants are expected to boost market growth. Furthermore, due to high demand from the end-user industries and growing demand for transparent conductive films (TCF) in the electronics industry are expected to increase the demand for the 2D materials market. Moreover, the global 2D materials market is expected to benefit from the expanding market of nanomaterials, which is expected to promote market expansion. The requirement for 2D materials is being stimulated by photovoltaics and sports equipment as well.

## Industrial Impact

Growing demand for energy storage devices and electronics is the main driving force behind the growing interest in the 2D materials market. As a result, these materials are getting prominence in a variety of industries, including composite and coatings, electronics, semiconductors, pharmaceuticals, automobiles, and energy storage devices, among others. One area where implementation has been significantly greater is composite and coatings, which have created opportunities for both existing market participants and market entrants.

Furthermore, 2D materials have a moderate to high impact on end-user industries; however, in the upcoming future, with increased production of consumer electronics, electric vehicles, biomedical devices, and other applications, the impact is anticipated to increase.

## Impact of COVID-19

The 2D materials market was affected moderately by COVID-19. The sales of fuel cell vehicles (FCVs) reduced significantly in 2020, with only 937 vehicles sold in the U.S., according to the California Fuel Cell Partnership. However, the sales rebounded spectacularly in 2021, increasing by 257% year-over-year and around 3,341 fuel cell vehicles sold. However, in the healthcare industry, the 2D materials market was among the few markets that were positively affected by COVID-19, and the market has since continued its growth. The COVID-19 outbreak has increased the use of 2D materials in the biomedical sector as they aid in infection control practices. Furthermore, 2D materials are also utilized in the production of biosensors to detect viruses and infections. Typically, synthesized 2D material-based biosensors provide simple, economical, perceptive, and easily adaptable SARS-CoV-2 detection.

## Market Segmentation:

### Segmentation 1: by End User

Composite and Coatings

Energy Storage Devices

Electronics

Semiconductor

Pharmaceuticals

Automobiles

Others

Based on end user, the composite and coatings segment led the 2D materials market in 2021 and was the largest segment due to the rising consumer demand for consumer electronics, interactive packaging, radiofrequency sensing, and other products, which is driving an increase in interest in flexible energy storage battery technology.

#### Segmentation 2: by Material Type

Graphene

Black Phosphorous

Transition Metal Dichalcogenides

Mxene

Hexagonal boron nitride

Others

Based on material type, the graphene segment dominated the 2D materials market in 2021 and was the largest segment owing to growing demand from end-use industries such as consumer electronics, medical devices, aerospace and defense, and semiconductor, owing to its higher electrical and thermal conductivity.

#### Segmentation 3: by Region

North America - U.S., Canada, and Mexico

Europe - Germany, France, Italy, Spain, and Rest-of-Europe

China

U.K.

Asia-Pacific and Japan - Japan, India, South Korea, Australia, and Rest-of-Asia-Pacific and Japan

Rest-of-the-World - South America, and Middle East and Africa

In the global 2D materials market, China dominates the market due to the strong presence of end-use industries such as photovoltaics, automotive, and others, along with the largest graphite deposit worldwide and growing sales of fuel cell vehicles.

#### Recent Developments in the Global 2D Materials Market

In September 2021, Colloids Limited introduced a new infrastructure for customized polymeric materials using its ground-breaking graphanced graphene masterbatch advanced technologies. Due to its extraordinary qualities, graphene has attracted a lot of attention. Additionally, it has exceptional mechanical characteristics as well as superior thermal and electrical permeability.

In December 2021, Black Swan Graphene Inc. signed a legally enforceable letter of intent to purchase Dragonfly Capital Corp., in a backward merger agreement for \$31.5 million. On December 13, 2021, Black Swan Graphene Inc. and Dragonfly Capital Corp. agreed to communicate shares in an opposite merger transaction. Stockholders of Black Swan would then obtain 15.2 consideration shareholdings for every ordinary Black Swan share they own.

In September 2022, NanoXplore purchases XG Sciences' assets. This procurement greatly enhances its intangible assets associated with graphene and battery materials augmented by graphene, and it also expedites the industry's entry into the rechargeable batteries material market.

#### Demand – Drivers and Limitations

The following are the demand drivers for the global 2D materials market:

Growing adoption of 2D materials in energy storage

Strong growth of 2D materials in the healthcare industry

Growing demand for transparent conductive films in electronics industry

The market is expected to face some limitations as well due to the following challenges:

Lack of large-scale production of high-quality graphene

High cost of production

How can this report add value to an organization?

**Product/Innovation Strategy:** The product segment helps the reader to understand the different material types involved in 2D materials. Moreover, the study provides the reader with a detailed understanding of the global 2D materials market based on the end user (composite and coatings, energy storage devices, electronics, semiconductors, pharmaceuticals, automobiles, and others). 2D materials are gaining traction in end-user industries on the back of sustainability concerns and their high durability properties. They are also being used for controlling greenhouse gas (GHG) emissions.

**Growth/Marketing Strategy:** The global 2D materials market has seen major development by key players operating in the market, such as business expansions, partnerships, collaborations, mergers and acquisitions, and joint ventures. The favored strategy for the companies has been product developments, business expansions, and acquisitions to strengthen their position in the global 2D materials market. For instance, in September 2022, NanoXplore purchased XG Sciences' assets. This procurement greatly enhances its intangible assets associated with graphene and battery materials augmented by graphene, and it also expedites the industry's entry into the rechargeable batteries material market.

**Competitive Strategy:** Key players in the global 2D materials market analyzed and profiled in the study involve 2D materials manufacturers and the overall ecosystem.

Moreover, a detailed competitive benchmarking of the players operating in the global 2D materials market has been done to help the reader understand how players stack against each other, presenting a clear market landscape. Additionally, comprehensive competitive strategies such as partnerships, agreements, acquisitions, and collaborations will aid the reader in understanding the untapped revenue pockets in the market.

### Key Market Players and Competition Synopsis

The companies that are profiled have been selected based on inputs gathered from primary experts, analyzing company coverage, product portfolio, and market penetration.

The global 2D materials market has been segmented by different end users, among which composite and coatings captured around 35.1% of the market as of 2021. Other end users, including energy storage devices, accounted for around 22.7%, the electronics industry accounted for 14.9%, semiconductor accounted for 6.1%, pharmaceutical accounted for 3.1%, automobiles accounted for 8.2%, and other end-use industry accounted for 9.9% of the total demand in 2021 in terms of value.

Some of the prominent established names in this market are:

#### Company Type 1 (by Material Type): Graphene

NanoXplore Inc.

Cabot Corporation

Thomas Swan & Co. Ltd.

Ossila Ltd

ACS Material LLC

American Elements

2D Materials Pte Ltd.

Blackleaf

BASF SE

6Carbon Technology

Garmor Tech

Nitronix Nanotechnology Corporation

PlanarTECH LLC

AVANZARE INNOVACION TECNOLOGICA S.L.

XlynX Materials Inc.

Layer One

2D Water

Company Type 2 (by Material Type): Black Phosphorus

Smart-elements GmbH

Ossila Ltd.

Company Type 3 (by Material Type): Mxene

Ossila Ltd.

ACS Material LLC

Company Type 4 (by Material Type): TMDCs

Ossila Ltd

6Carbon Technology

PlanarTECH LLC

Company Type 5 (by Material Type): Hexagonal Boron Nitride

Ossila Ltd

6Carbon Technology

Companies that are not a part of the previously mentioned pool have been well represented across different sections of the report (wherever applicable).



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