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Japan Near Infrared Absorbing Materials Market Assessment, By Material [Organic, Inorganic], By Absorption Range [700-800nm, 800-900nm, 900-1000nm, >1000nm], By Application [Heat Ray Shielding Materials, Laser Welding, Anti-counterfeit, Electronic Sensors, Photovoltaics, Others], By End-user [Electrical & Electronics, Telecommunications, Defense & Security, Healthcare, Others], By Region, Opportunities and Forecast, FY2017-FY2031

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Abstracts

Japan near-infrared absorbing materials market size was valued at USD 43.14 million in FY2023, which is expected to reach USD 97.4 million in FY2031, with a CAGR of 10.7% for the forecast period between FY2024 and FY2031. Near-infrared absorbing material has a specific structural configuration where the excitation of electrons leads to the absorption of infrared light. The functionality of sophisticated and advanced instruments is prominently enhanced by near-infrared (NIR) absorbing materials integrated into these smart devices. Incorporating materials enables significant features like thermoregulation, spectroscopy measurement, energy-efficient applications, etc. NIR absorbing coatings are decisively being employed in building construction materials, which assist in regulating surface temperatures, reduce energy consumption, and contribute to sustainable building practices.

Near Infrared (NIR) absorbing materials successfully improves imaging contrast and specific treatments like photothermal therapy and fluorescence. Medical domain practices such as skin treatment, surgery, spectroscopy, thermography, etc. are accomplished using NIR-absorbing materials. NIR absorbing materials are used for

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preparing absorbing dyes that are progressively used as photothermal conversion materials, thermal media materials, etc., which can effectively work in different absorption spectrum ranges.

Organic Solar Cell Applications Augment Near Infrared Absorbing Materials

The photovoltaic performance of tandem organic solar cells (TOSCs) by effective design using near-infrared absorbing acceptor materials. These promising absorbing acceptors exhibit superior broad absorption and high photovoltaic performance, substantially leading to constructing the rear cell in high-performance TOSCs. Lightweight, flexibility, and low-cost solution processability are prominent advantages of TOSCs that have effectively considered a potential application as a reliable, clean energy source.

The solar project supported by the Ministry of the Environment (MoE) feed-in tariff (FIT) has estimated that in 2022 Japan will have a 6.5 GW solar market. The data published by the Japan Photovoltaic Energy Association estimates that the country has shipped around 3,536 MW of solar modules from January to September 2022, with only 3,520 MW contributed to the people of Japan. The incredible shift towards renewable sources has significantly generated global opportunities for near-infrared absorbing materials to implement in solar cells, which will augment the market in Japan.

Production and Synthesis of Infrared Absorbing Materials to Drive the Digital World

Near-infrared absorbing materials are considered important in the development of advanced digital cameras and imaging devices. The production of NIR materials involves complex synthesis process, sophisticated equipment, and advanced monitoring control. These crucial processes account for huge cost of materials, which it creates a significant challenge for the widespread usage of NIR materials in more sectors.

NIR-absorbing white material comprises of copper pyrophosphate which is produced using wet synthesis process where an aqueous solution of a divalent copper compound and a metal pyrophosphate is formed as a supersaturated solution. The synthesis process is accompanied by stirring, mixing, filtration, acid treatment, washing, and drying, which makes the manufacturing process complex and costly. However, heat-absorbing glass is formed by NIR-absorption of iron components and can be manufactured inexpensively, where these glasses are substantially used in shielding window glass from solar radiation.

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Near Infrared Absorbing Dyes Revolutionize the Optical Communication Industry

The extensive potential applications of near-infrared (NIR) absorbing organic dyes have gained considerable value in sectors like biology, optical sensors, optical communications, etc. Heptamethine cyanine (HMC) is proven very effective as an organic dye that subsequently absorbs NIR light with excellent optical properties like selective absorption in the specific NIR range and a high molar absorption coefficient. Novel HMC dye with trifluoromethyl groups delivers a more red-shifted absorption wavelength and improved photostability characteristics that prominently enhances the communication systems.

According to greenfield investment data reported by FDI Markets in Financial Times in 2021, the communication sector in Japan showed approx—20% enhancement in new projects with a growth rate of 81.8%. According to the reported data, in June 2021 a tech-company has invested USD 1,000 million which instigated the construction of large-scale data center in Saitama, Japan with a huge capacity of 100 MW. Likewise, a phenomenal opportunity has been accomplished for near-infrared absorbing dyes market in Japan with the growing telecommunication industry.

The extensive applications of NIR absorbing materials is propelling the global market size growth with huge opportunities in the respective domains and countries.

Impact of COVID-19

The outbreak of COVID-19 has aggravated the worldwide healthy living of people, where the rapid dispersion of infection severely impacted economic, social, and health infrastructure. Reduction in consumer demand and prevailing uncertainties led to the downfall of products that incorporate near-infrared absorbing materials, such as automotive, electronics, real estate, etc. NIR-spectroscopy is an inexpensive technique for profiling COVID-19 disease that utilizes NIR-absorbing materials that are progressively used in the coatings of medical devices. It significantly gained momentum during the pandemic as the healthcare sector grew tremendously with the indispensable need for healthcare facilities. Subsequently using NIR absorbing materials, this spectroscopic method is used to authenticate COVID-19 vaccines, which is substantially recognized as a rapid and effective technique. Potentially, even during the COVID-19 pandemic, the market for near-infrared absorbing materials was rising effectively to authenticate COVID-19 vaccines which generated huge market for near-infrared absorbing materials in Japan.

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Impact of Russia-Ukraine War

The invasion of Russia on Ukraine has created an unprecedented impact across various sectors leading to instability in sequential investment. The aggression has profoundly affected the supply chain relationship, raw materials incumbency, etc. The NIR absorbing materials significantly got hit to implement in manufacturing essential infrared equipment that substantially have applications in the various healthcare sectors. The harsh sanctions imposed on Russia has enforced Japan to reduce their trade with Russia severely impacted the trade dynamics of technological materials and sharing of advanced technologies for NIR absorbing materials. But with the growing market commodities in the healthcare sector, demand of NIR absorbing materials increases in Japan which is encouraged by companies to develop indigenous NIR absorbing materials that subsequently augment the huge market potential in Japan.

Key Players Landscape and Outlook

The wide usage of near infrared absorbing materials in different essential sectors is significantly driving the NIR absorbing materials market, encouraging high-tech companies to develop innovative products related to specific properties. Sumitomo Metal Mining Co., Ltd. has developed proprietary CWO and LaB6 materials specifying a scattering array of selective plasmonic nanoparticles and has the potential to strongly absorb near infrared light in the range of 800-1200 nm. Their absorbing material has extensive applications that successfully convert light into heat along with sunlight control filters for building windows and automobiles. In May 2022, the company acquired Sumitomo Osaka Cement Co., Ltd. Venture, undertaking their lithium iron phosphate (LFP) battery materials division. It successfully incorporated their proprietary infrared materials into the battery applications.

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*Companies mentioned above DO NOT hold any order as per market share and can be changed as per information available during research work

16. STRATEGIC RECOMMENDATIONS

17. ABOUT US & DISCLAIMER

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