Application of Biological Carbon Sensitive Quantum Dots in Environmental Art Design

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Abstract: The speed of urban construction is gradually speeding up, the environmental art design gradually become people's interest, it is necessary for building materials in environment art design to make a choice, the use of green building materials can promote the technology of green environmental protection material industry and the development of the market, and more green environmental protection building materials itself made use of waste, at the same time to use fixed number of year of the limit can be recycled after use again, fit the need of sustainable development strategy in our country. In this paper, a low-cost and environmentally friendly method, biological template method (canna stalk), was used to successfully prepare the graduated porous biological carbon material by carbonization at high temperature (800°C), and the morphology of canna stalk was completely copied. There are a lot of tubular and lamellar biological tissues in nature. After carbonization, a thin layer of carbon with curly folds can be formed. This structure is very suitable for in-situ synthesis of quantum dots and long-term stability of quantum dot materials. It is expected that in the near future, this technology will create a variety of sensing materials with excellent performance.

1. Introduction

Along with the social and national improve attaches great importance to the degree of sustainable development strategy and promote, all kinds of industry in promoting the recycle of the waste generated from the industry efficiency and value, and the use of green building materials can promote the technology of green environmental protection material industry and the development of the market, and more green environmental protection building materials itself made use of waste, at the same time to use fixed number of year of the limit can be recycled after use again, fit the need of sustainable development strategy in our country. According to the British report, if the world maintains the current high-carbon economic growth pattern, the earth's temperature will increase by 5 ℃ -6 ℃ and the gross domestic product will be lost by 10-5%. In the process of environmental design, it is necessary to select building materials. Natural materials are the best choice for building materials, because many common natural materials are relatively simple, such as bamboo, the raw materials of bamboo, are planted in many places in China, the air humidity is high, with good heat absorption performance and good material performance. Secondly, the price of natural materials is relatively low, easy to decompose, the harm to the natural environment is also relatively low.

Global warming reflects the advantages of economic competition and energy development. At present, the world mainly relies on coal, oil, natural gas and other high-carbon mineral energy, and some countries also have their own energy, and are fighting a fierce battle for energy security. The global death toll from indoor pollution has reached 280 million, a staggering number that is starting to draw attention to the development and use of increasingly healthy, environmentally friendly materials in the construction industry. As an important part of environmental art design, architectural design should strengthen the research and utilization of low-carbon environmental protection materials. This not only enhances the environmental friendliness of the final environmental design, but also makes the low-carbon concept more fully implemented.

This article adopts the method of a low cost and environmental friendly, biological templates method (canna stem), after high temperature (800 ° C) method of carbonized hierarchical porous biological carbon material success, completely copy the canna stem morphology, material with abundant porous structure, load and electrochemical reaction of metal oxide quantum dots in the electron mobility provides a good environment.

2. Method

2.1 Comparison between Green Environmental Protection Building Materials and Traditional Materials

(1) Particularity of green environmental protection building materials

Traditional building materials tend to have more toxic substances and pollutants, which not only damage people's health when they decorate and live, but also cause great damage to the environment and even the atmosphere. Meanwhile, more carbon dioxide produced by traditional building materials contributes to the greenhouse effect. Green environmental protection building materials are often made from waste materials recycled from cities and wastes generated from industrial production. The raw materials used are usually free of toxic substances and radioactive substances, and produce less carbon dioxide, which is green, environmentally friendly, less consumed and less polluted.

(2) The functionality of green building materials

Green environmental protection building materials are not only green environmental protection but also have stronger functions. Nowadays, green environmental protection building materials are not only diversified and beautiful, but also some green environmental protection building materials can shield harmful radiation and carry out certain automatic regulation function for temperature. For example, the green environmental protection building materials with thermal insulation effect on the external walls can be designed to dynamically change according to different temperatures and seasons to achieve the purpose of temperature regulation.

2.2 Use of Green Environmental Protection Building Materials

Measures about the utility of exterior wall thermal insulation and construction to realize saving energy and reducing consumption for external wall insulation ability, must pay attention to, and in recent years under the continuous development of science and technology has improved the performance of exterior wall thermal insulation materials and types are increasingly rich, not only the pursuit of efficiency and energy-saving, and to the requirement of environmental protection also have higher development. At present, there are three main applications of green building materials in external wall insulation: rock wool, glass fiber mesh cloth and polystyrene film plastics.

(1) Rock wool is a kind of artificial inorganic fiber material produced by high temperature melting centrifugal blowing after adding auxiliary materials. It can be applied to the external wall insulation to enhance the stability of the long-term use of external wall insulation, guarantee the insulation performance to a certain extent and improve the safety of the building.

Fiberglass mesh cloth is widely used in the protection and insulation of building walls because of its good flexibility, strong resistance to transverse tensile force, good water resistance and good heat preservation.

3. Experiment

3.1 Experimental Reagent

Reagents and instruments used in the synthesis experiment of CeO2 quantum dot materials are shown in Table 1.

Table 1. Reagents and Instruments Used in the Synthesis Experiment of CeO2 Quantum Dot Materials

Name of reagent used	Reagent specifications	The instrument
Cerium nitrate hexahydrate	Analysis of pure	ConstanttemperatureandhumiditychamberHWS-150.(220V,50/60Hz)
Canna stalks	Creatures of pure	Tube furnace (No. V215011U) GSL-1600r-Ⅲ (220 v, 50/60 hz)
Concentrated hydrochloric acid	Analysis of pure	Programmed box type furnace SXL-1002
Anhydrous ethanol	Analysis of pure	Electrochemical workstation(412708 a) CHI660D
Deionized water	Creatures of pure	Inverted fluorescence microscope OLYMPUSTH4-200
Ultrapure water	Creatures of pure	Electronic balance BSA224S
Alumina	Analysis of pure	Freeze-dryer Free zone 2.5L

3.2 Pretreatment of Experimental Template

Canna is a herb with a large rhizome. Fresh canna stalk was used as biological template. Collect fresh banana stalks by the river, cut them into 2-5 cm long and wash them. In a beaker, prepare 1 L of a solution of deionized water and anhydrous ethanol, and slowly add the actual solution to the solution. To prevent seal impurities, soak for 2-3 days and use deionized water to neutrally clean the trunk. The washed culms were freeze-dried for 12 hours in a vacuum lyophilizer and removed to avoid losing culm water all at once.

4. Discussion

4.1 Analysis of Synthetic Materials under Fluorescence Microscope

The photo of the composite sample of fresh plant stem and cerium nitrate concentration under the light microscope is shown in Figure 1.

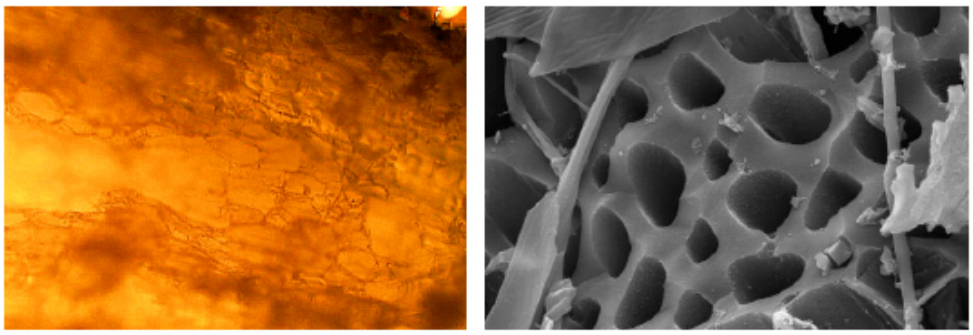

Figure 1. Composite Sample of Fresh Plant Stem and Cerium Nitrate Concentration under Light Microscope

The transverse section of the stem is covered with large holes. As it is rich in macroporous structure, it fully conforms to the biological template that is seeking to prepare biosimilar carbon materials. Microporous structure of plant stem is the main route for nutrient transport, which

provides a path for electron transmission during electrochemical performance test. Its fine morphology and structure will be observed by scanning electron microscope. The morphology of the samples synthesized with cerium nitrate concentration is not very different, it can replicate the biological morphology of canna stalks, and the pore structure is abundant. However, due to the low concentration, fewer cerium oxide particles are formed in the pore structure and surface, and the distribution is not uniform. Cerium oxide particles are evenly distributed on the surface of the bionic material. Once there is a large amount of accumulation, the surface structure of biological carbon will break. Due to the relatively high concentration of cerium nitrate solution, the biological morphology of canna stem could not be duplicated, which led to cerium oxide particles blocking the pore structure and affecting its sensing performance. The concentration of cerium nitrate solution is too high, which leads to the accumulation of cerium oxide particles covering multiple layers.

4.2 XRD Analysis of Quantum Dot Materials Synthesized by Cerium Nitrate at Different Concentrations

The XRD pattern of CeO2 quantum dot/biological carbon material is shown in Figure 2.

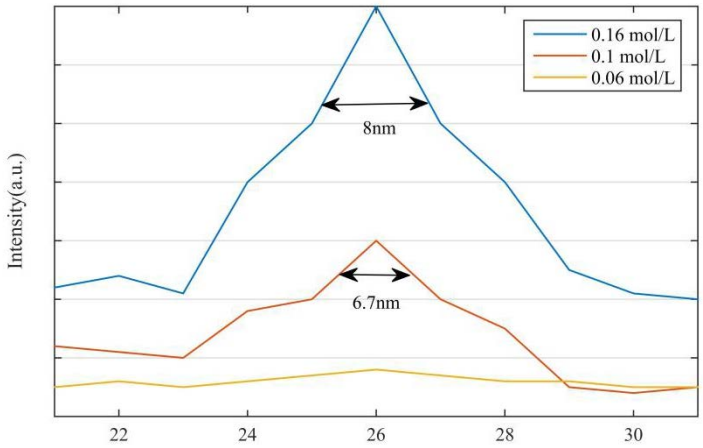

Figure 2. XRD Pattern of CeO2 Quantum Dots/Biological Carbon Materials

There were no impurity peaks in the spectrum. When CeO2 metal oxide particles were loaded on the surface of biological carbon, the characteristic peaks appeared at 28.549°,33.077°,47.483°,56.342°,59.090°,69.416°,76.704° and 79.077°, and they corresponded to the characteristic peaks of the crystal plane of the somatic cubic structure CeO2(JCPDSNo:43-1002) (111),(200),(220),(311),(222),(400),(311) and (420), respectively. It can be seen from the figure that with the increase of the concentration of cerium nitrate solution, the amount of metal oxides loaded on the biological carbon increases, and the crystallinity is better. The lower the characteristic peak of the material is, the wider the half-peak width is, and the smaller the grain size of the crystal is. When the concentration of cerium nitrate solution is 0.1 mol/L, the grain size of the crystal is calculated according to the xie le formula, and the grain size is 6.7 nm. With the continuous deepening of sustainable development and people's pursuit of green life and the need for green building materials in the future will be more and more applications in engineering, in the market has a very broad prospect. Performance and green building materials is not less traditional materials even some advantages, for short-term interests in the past, some companies of high resource consumption high pollution to the environment for a long time to run, brought huge damage for the environment, the concept of the sustainable development of green environmental protection is the necessary trend to solve the problem of environmental pollution, as one of high pollution industry, construction industry should strengthen the use and research and development of green building materials, to reduce carbon emissions, and promote the protection of the environment.

Conclusion

As the society and the country pay more and more attention to the sustainable development strategy, various industries are improving the recycling efficiency and value of the wastes generated

by the industry. The use of green building materials can promote the development of the technology and market of the green building materials industry. The main way to practice low-carbon environmental awareness in environmental art design is through the selection of low-carbon environmental materials. Therefore, to further contribute a huge force in the cause of environmental protection, it is necessary to strengthen the design of low-carbon environmental protection materials for future applications. In this paper, a low-cost and environmentally friendly method, biological template method (canna stalk), was used to successfully prepare the graduated porous biological carbon material by carbonization at high temperature (800°C), and the morphology of canna stalk was completely copied. There are a lot of tubular and lamellar biological tissues in nature. After carbonization, a thin layer of carbon with curly folds can be formed. This structure is very suitable for in-situ synthesis of quantum dots and long-term stability of quantum dot materials.

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