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Times New Roman, 10

二甲醚清洁燃料均质压燃燃烧数值模拟研究

摘要

HCCI

NO_x

HCCI

300-500

HCCI

DME HCCI DME

Lawrence Livermore DME

DME

HCT

EGR

HCCI DME HCCI

H_2O_2

H_2 CO EGR CH_4 CH_3OH

关键词：EGR

OPTICAL PROPERTIES OF COMPOSITE MATERIALS MADE FROM HYDROGEL AND BUTTERFLY WING SCALES

Times New Roman, 16

Times New Roma.n, 12

1.5

ABSTRACT

Times New Roma.n, 14

Lepidopteron wing scales with their periodic dielectric structures producing glaring iridescent colors attract great attention in bio-photonic devices design and fabrication during the past decade. One inevitable drawback of these bio-templates is the lack in flexibility limited by the wing scales' inborn inner microstructure. We design two novel routes to control and modify the original structure of Chrysiridia rhipheus (sunset moth) wing scales and thus their optical properties, using a kind of biocompatible environment sensitive interpenetrating polymer network (IPN) chitosan/PVA. The immobilized wing scales' visible reflectance is responsive to both the electric field and the pH condition, owing to their inner microstructure change induced by the IPN volume change in the swell/deswell process driven by electric field and pH condition. Using electric field as the driving force, we obtain a total ~150nm visible reflectance shift within several minutes, which can be used as an optical switch or electric field sensor; in pH driving system, we obtain a total ~260nm visible reflectance shift, and prominent sensitivity of moth wing scale indicator's optical property in week basic condition (pH=8-10) promises an in vivo bio-sensing pH monitor that can be used in general bio-medical and bio-controlled applications. Our multi-responsive optical sensors for E-field and pH condition broaden the natural species' pool for functional structure selection, and provide designable and controllable bio-inspired material solutions according to specific practical demands.

Key words: Biomedical Sensor, Lepidoptera scales, Nature photonics, Optical sensor/indicator, Electric field sensitive, pH condition sensitive, Interpenetrating polymer network

Times New Roma.n, 12

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Key words

Times New Roma.n, 14

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Contents

12 Times New Roman 1.5

Times New Roma.n, 14

Chapter One Introduction

Photonic crystals (PCs) can be regarded as ‘‘light semiconductors’’, since they can affect light propagation in a similar way as electro-semiconductors do to electron transportation. Such specified control of light is important to many optical devices. Despite the advantages of PCs’ light selectivity, bottlenecks in their syntheses, especially for the three dimensional (3D) PCs, impede their broad applications. However, nature never fails to inspire us with her masterpieces. Some species like butterflies, beetles, and birds have natural PC structures ([1], NAME, YEAR: P.). These dielectric structures produce glaring iridescent colors, inspiring us with bio-PCs that can be used as optical devices, and thus have been attracting great attention especially in the past decade.

Times New Roma.n, 14

1.1 Section

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$$m \qquad m_k \qquad \text{2-1}$$

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$$f(x,y) = f(0,0) + \frac{1}{1!}(x\frac{\partial}{\partial x} + y\frac{\partial}{\partial y})f(0,0)$$
$$+ \frac{1}{2!}(x\frac{\partial}{\partial x} + \frac{\partial}{\partial y})^2 f(0,0) + \mathrm{K}$$
$$+ \frac{1}{n!}(x\frac{\partial}{\partial x} + \frac{\partial}{\partial y})^n f(0,0) + \mathrm{K}$$

12 Times New Roman

Table 1.1

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Table 1.1

A	B	C	D
A1			
A2			
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Table 1.1

A	B	C	D
A4			
A5			
A6			
A7			
A8			

Times New Roma.n, 14

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NUMERICAL SIMULATION OF HOMOGENEOUS CHARGE COMPRESSION IGNITION COMBUSTION FUELED WITH DIMETHYL ETHER

12 Times New Roman 1.5

Times New Roman

HCCI (Homogenous Charge Compression Ignition) combustion has advantages in terms of efficiency and reduced emission. HCCI combustion can not only ensure both the high economic and dynamic quality of the engine, but also efficiently reduce the NO_x and smoke emission. Moreover, one of the remarkable characteristics of HCCI combustion is that the ignition and combustion process are controlled by the chemical kinetics, so the HCCI ignition time can vary significantly with the changes of engine configuration parameters and operating conditions. ……