

### **Correction of the Intensity-Dependent Phase Delay in a Silicon Avalanche Photodiode by Controlling Its Reverse Bias Voltage**

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IEEE Journal of Quantum Electronics, vol.39, NO.7, pp.919-923, July 2003

When an intensity-modulated periodic light is incident on a reverse-biased silicon-avalanche photodiode (APD), a phase of an output signal from the APD over that of the incident light is delayed. The phase delay becomes large with decreasing in the incident light intensity. This kind of phase delay is a serious problem for an optical distance meter that utilizes the APD as a photo detector. To solve this problem, we propose a new correction method: For a situation of the low light intensity, the reverse bias voltage applied for the APD is decreased. Adjustment of the reverse bias voltage enabled us to suppress a phase delay around 60 degrees to be less than 0.2 degree for an incident light intensity 0.5 mW, a modulation frequency 600 MHz, and a wavelength 632.8nm.

### **Isolation and Characterization of Poly(Butylene Succinate-co-Butylene Adipate)-Degrading Microorganism**

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Journal of Bioscience and Bioengineering, vol.97, NO.2, pp131-133, (2004)

Poly(butylene succinate-co-butylene adipate) (PBSA)-degrading bacterium, strain 1-A, was isolated from soil. Strain 1-A was identified as *Bacillus pumilus* on the basis of its physiological properties and partial 16S rRNA gene sequence. Strain 1-A also degraded poly(butylene succinate) (PBS) and poly( $\epsilon$ -caprolactone). On the other hand, poly(butylene adipate terephthalate) and poly(lactic acid) were minimally degraded by strain 1-A. The NMR spectra of degradation products from PBSA indicated that the adipate units were more rapidly degraded than 1,4-butanediol and succinate units. This seems to be one of the reasons why strain 1-A degraded PBSA faster than PBS.

### **The Enzymatic Degradation of Commercial Biodegradable Polymers by Some Lipases and Chemical Degradation of Them**

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Macromol. Symp. , Vol.197 , p 431-442 (2003)

Biodegradable polyesters , poly(butylene succinate adipate)(PBSA) , poly(butylene succinate)(PBS) , poly(ethylene succinate)(PES) , poly(butylene succinate)/poly(caprolactone)blend (HB02B)and poly(butylene adipate terephthalate)(PBAT) , were evaluated about degradability for enzymatic degradation by lipases and chemical degradation in sodium hydroxide solution. In enzymatic degradation , PBSA was the most degradable by lipase PS , on the other hand , PBAT containing aromatic ring was little degraded by eleven kinds of lipases. In 1N NaOH solution , degradation rate of PES with ethylene unit was extremely fast , in comparison with other polyesters. Interestingly the degradation rate of PBSA in enzymatic degradation by lipase PS was faster than in chemical degradation ,

### (区 分 C)

#### 各種作製法によって調製されたペロブスカイト型酸化物 $\text{LaCoO}_3$ 粉末の特性

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新居浜工業高等専門学校紀要、第40巻、p.33-39、2004.

ペロブスカイト型酸化物 $\text{LaCoO}_3$ を3つの異なる調製法から作製した。 $\text{La}_2\text{O}_3\text{COO}$ との混合物を仮焼したものの(La-Co-O)、 $\text{La}_2(\text{C}_2\text{O}_4) \cdot \text{XH}_2\text{O} + \text{CoC}_2\text{O}_4 \cdot \text{yH}_2\text{O}$ 共沈前駆体の熱分解物(La-Co-ox)及び異核錯体 $\text{La}[\text{Co}(\text{CN})_6] \cdot 5\text{H}_2\text{O}$ の熱分解物(La-Co-CN)である。調製した各前駆体の特性を、熱重量測定、粉末X線回折測定、走査型電子顕微鏡観察及び比表面積測定などによって検討した。 $\text{LaCOO}_3$ 単相の生成は、La-Co- が1000°C以上、La-Co-oxが1200 °C以上、La-Co-CNが600(C以上で認められた。600 °Cで2時間熱処理されたLa-Co-CNの結晶粒子径は72nmであった。La-Co-CNの熱分解によって得られた $\text{LaCOO}_3$ ペロブスカイト粉末は原子レベルで非常に均一であり、低温でナノサイズの $\text{LaCoO}_3$ 粉末が得られた。

### (区 分 E)

#### Temporal Emission Characteristics of Pulse-Driven and Sinusoid ally-Modulated White Light-Emitting Diodes

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CLEO<sup>®</sup>/Pacific Rim 2003 The 5th Pacific Rim Conference on Lasers and Electro-Optics , Taipei ,  
December 15-19 , 2003

For a sensor purpose , we measured temporal emission waveforms of pulse-driven and sinusoidally-modulated white light-emitting diodes (LEDs). Comparison was made for three types of LEDs provided by different manufactures , NSPW300BS (Nichia Chemical Co. ) , WZB-52P (Sumitomo Co. ) and EIS09-OWIAP-02 (Toyoda Gousei Co. ) . From the present experiments , We found that the temporal behaviors of the white LEDs could be applied to a novel photosensing system without wavelength dispersion element.

#### 紫外LEDを用いた波長選択的高速光検出器

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第51回応用物理学関係連合講演会, p.1108 (29p-R-12), 東京工科大学(八王子), 2004年3月

GaN系材料技術の進歩により, 発光ダイオード(LED: light-emitting diode)の発光波長は紫外領域まで達している。LEDは, 構造的にはp-n接合であるため, 原理的に光検出器としても動作する。これまでに青色LEDに対して, 発光波長よりも若干短波長側に狭い吸収スペクトルを有することが報告されている。このような性質を利用すれば, 高速応答・小型・安価な波長選択的光検出器としての利用も期待できる。今回, 我々は紫外LED(NSHU590E, ピーク波長:375nm, 日亜化学)を光検出器として用い, その分光応答特性と過渡応答特性について調べた。

## (区 分 G)

### 生分解性ポリマーを分解する微生物, 及びそれを用いて生分解性ポリマーを分解処理する

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特開2003 - 310248

生分解性ポリマーであるポリブチレンサクシネートアジペート(PBSA), ポリブチレンサクシネート(PBS), ポリカプロラクトン(PCL)を分解するバクテロイデア(Burkholderia)属に属する微生物または培養物をポリブチレンサクシネートアジペート(PBSA), ポリブチレンサクシネート(PBS), ポリカプロラクトンに接触させることにより分解する。