

# 2011 年臺灣國際科學展覽會

## 優勝作品專輯

國家：Philippines

編號：030026

### 作品名稱

**Synthesis and Characterization of Starch-Nanosized  
Calcium Phosphate Composites**

### 得獎獎項

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### 作者姓名

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## ABSTRACT

Nano-sized calcium phosphate was used in the synthesis of starch-based composite plastics to provide a cheap but sturdier biodegradable alternative to petroleum derived plastics used in film packaging. Nano-sized calcium phosphates were produced from the precipitation reaction of calcium nitrate tetrahydrate ( $\text{Ca}(\text{NO}_3)_2 \cdot 4\text{H}_2\text{O}$ ) and phosphoric acid ( $\text{H}_3\text{PO}_4$ ). The nanoparticles were co-extruded and molded with thermoplastic starch (TPS) at ratios of 0%, 1%, and 5% by mass. Tensile strength and elongation percentage of the resultant composite plastics were tested in three replicates. The results show that there is a significant difference between the tensile strengths of the 0% and 5% calcium phosphate composites at a 5% level of significance. The trend between the composite's tensile strength and percentage calcium phosphate follows a geometric progression, enabling a projection for the 10% nano-calcium phosphate to have a tensile strength of 10 MPa, the average tensile strength for low-density polyethylene (LDPE). This shows that it is feasible to synthesize a 10% nano-calcium phosphate-TPS plastic that can be a viable substitute for LDPE plastics in film packaging, paving the way for the commercialization of starch-based plastics. The use of biodegradable plastics with improved physical characteristics will lessen consumer dependence on petroleum derived plastics and solve the environmental issues brought about by the use of such plastics.

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Reyes, Miguel Arnold S.

## 評語

This project is preparation of starch calcium phosphate composite material and study of its mechanical properties. The results are complete and valuable. It is awarded as second place.