

**Title** Biosynthesis of new material of food packaging PHB with a high molecular mass  
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### **Abstract**

**Introduction:** Poly- $\beta$ -hydroxybutyrate (PHB) has already become the hot spot research of food packing area because having excellent biological compatibility and degradation as a kind of new plastic substitute. PHB can be produced by various species of bacteria. Of the possible carbon sources, both methane and methanol could be a suitable substrate for the production of PHB. Methane is cheap and plentiful not only as natural gas, but also as biogas. Methanol can also maintain methanotrophic activity in some conditions. The methanotrophic strain *Methylosinus trichosporium* IMV 3011 can synthesize PHB with methane and methanol in a brief non-sterile process. In order to obtain microbial species of high production PHB low carbon cost, the ability of accumulating PHB was studied. **Materials and Methods:** 0.1% liquid methanol was added to improve the oxidization of methane under a CH<sub>4</sub>/air gas mixture (1:1 v/v). Cultivation was performed in two stages: a continuous growth phase and a PHB accumulation phase under deficiency conditions of essential nutrients (ammonium, nitrate, phosphorus, copper, iron, magnesium or ethylenediamine tetraacetate cultivation condition in second stage to produce PHB were determined. **Results and Discussion:** The suitable time in first stage and cultivation condition in second stage to produce PHB have been obtained. The cell concentration could be much improved to 2.5g/L. When Citric acid was chosen as an inhibitor of tricarboxylic acid cycle (TCA) for the increase of PHB content, it has been found favorable for the promotion of the PHB accumulation, and the PHB content of biomass could achieve 34.9% (w/w) from initial content of 12% (w/w) after nutrient deficiency cultivation. The PHB produced is of very high quality, having a high molecular mass high up to 105, which could be controlled by some conditions.