



Singreen Stretch Film



ABOUT OUR COMPANY



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Jiangsu Sinyar Plastic technology Co.,Ltd is located in No. 3, Wuyu Road, Yuqi Town, Huishan District, Wuxi City, China.

Our partners in Europe are **WITTUR, KONE, IKEA, Schindler etc.**

Our company have passed **ISO9001,ISO 14001,ISO 45001** certifications and all products have passed **SGS,FDA,DOA,ROHS** etc, certification.

For biodegradable winding film, we currently have raw material certificate and are applying for **ISO** certificate



Schindler



1.
**BIODEGRADABLE
STRETCH FILM**



In recent years, many international companies have been committed to environmental protection and have launched degradable stretch films.

近年来，许多国际公司致力于环保，纷纷推出可降解缠绕膜

The mainstream degradable stretch film on the market is PBAT+PLA

市场上主流的可降解缠绕膜是PBAT+PLA

Our company has cooperated with many domestic laboratory materials experts, and after years of research and development, we will launch the most suitable solution for the biodegradation of wrapping film in 2022.


我司联合国内多个实验室材料学专家，经过多年研发论证，于2022年推出了最适合缠绕膜生物降解的方案



PBAT+PLA

Chitosan





**PRINCIPLE OF
CHITOSAN
BIODEGRADABLE
STRETCH FILM**



Principle of chitosan biodegradable stretch film

First Step

1、 The chitosan biodegradable stretch film will maintain the integrity of the product for **24 months** before the beginning of physical degradation.

Since the molecular weight of polyolefins (such as polyethylene) is in a large range, usually 250000, they are not easy to be biodegraded by bacterial and fungal activities at this molecular weight.

1、 拉伸膜在物理降解开始之前将保持24个月内产品的完整性。

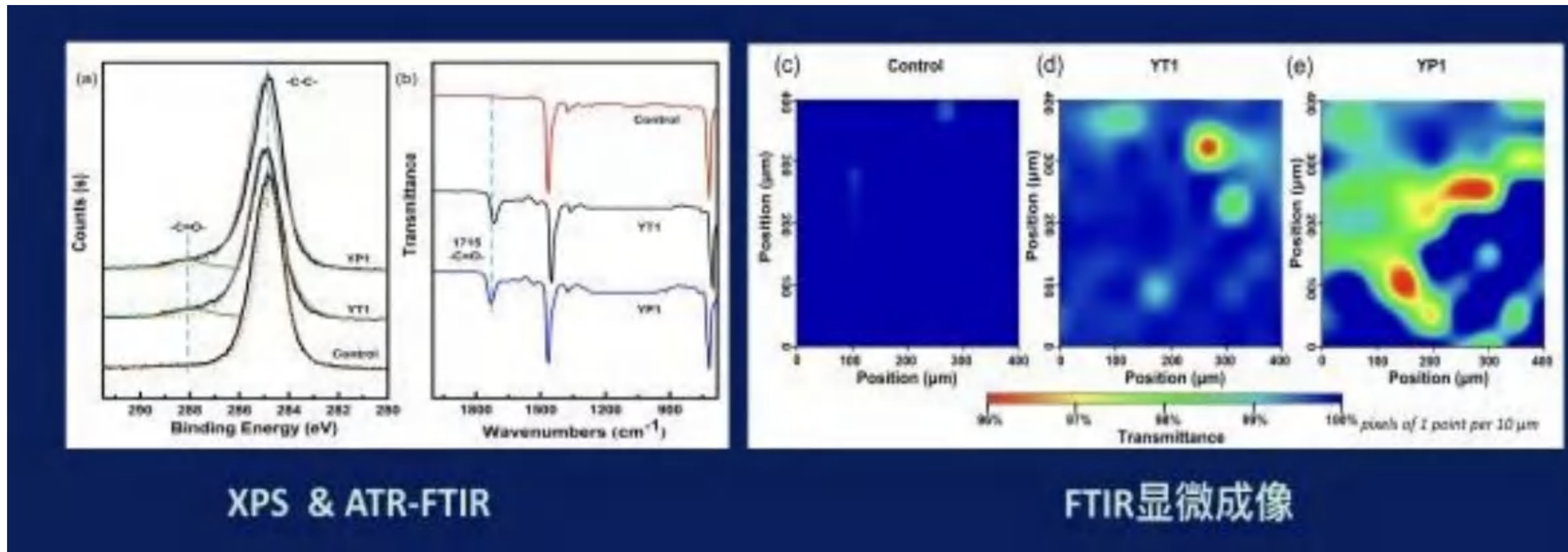
由于聚乙烯等聚烯烃（聚合物）的分子量在很大的范围内，通常为250000，在这个分子量下，它们不容易被细菌和真菌活性生物降解。

Sinyar PACKING FILM Principle of chitosan biodegradable stretch film

The Second Step

The molecular weight of polyethylene is reduced to below 10000 through the oxidation of biological catalyst chitosan. This long chain C-C single bond of polyethylene breaks into a hydrophilic carbon oxygen double bond carbonyl group due to the induction of chitosan.

2、通过氧化生物催化剂——甲壳质的作用，将聚乙烯的分子量降低到10000以下，聚乙烯的这种长链的C-C的单键由于甲壳质的诱导，断裂成为一个亲水的碳氧双键的羰基。



By improving the hydrophilicity of polyethylene, bacteria and fungi are able to bio-digest the lower MW polymer, respiring CO₂ and H₂O.

提高了聚乙烯的亲水性，细菌和真菌就能够生物消化分子量较低的聚合物，呼出CO₂和H₂O。

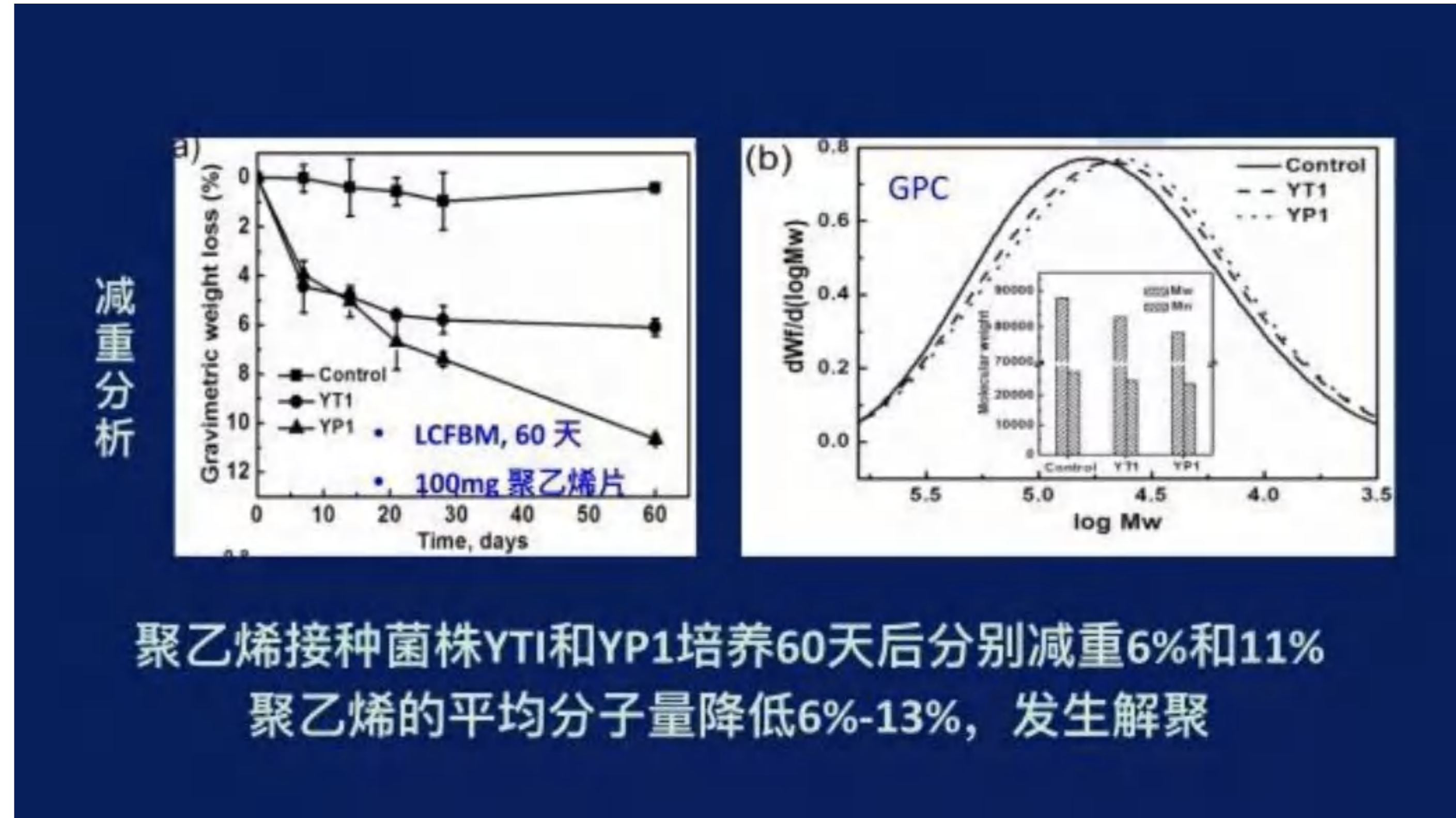
Sinyar PACKING FILM Principle of chitosan biodegradable stretch film

The Third Step

The breaking (degradation) of the long chain C-C single bond of polyethylene leads to the continuous reduction of the molecular weight of the polymer, which ultimately results in acute embrittlement, micro-fragmentation and subsequent availability for biodegradation.

3、聚乙烯的长链的C-C单键的断裂（降解）导致聚合物分子量的连续降低，最终导致急性催化、微破碎和随后的生物降解，直到生物将其全部分解为CO₂,H₂O和有机物。

测试显示了添加甲壳素后，拉伸膜中羰基的形成和各个阶段的水平，展现出聚乙烯由疏水性到亲水性的变化。



聚乙烯接种菌株YT1和YP1培养60天后分别减重6%和11%
聚乙烯的平均分子量降低6%-13%，发生解聚

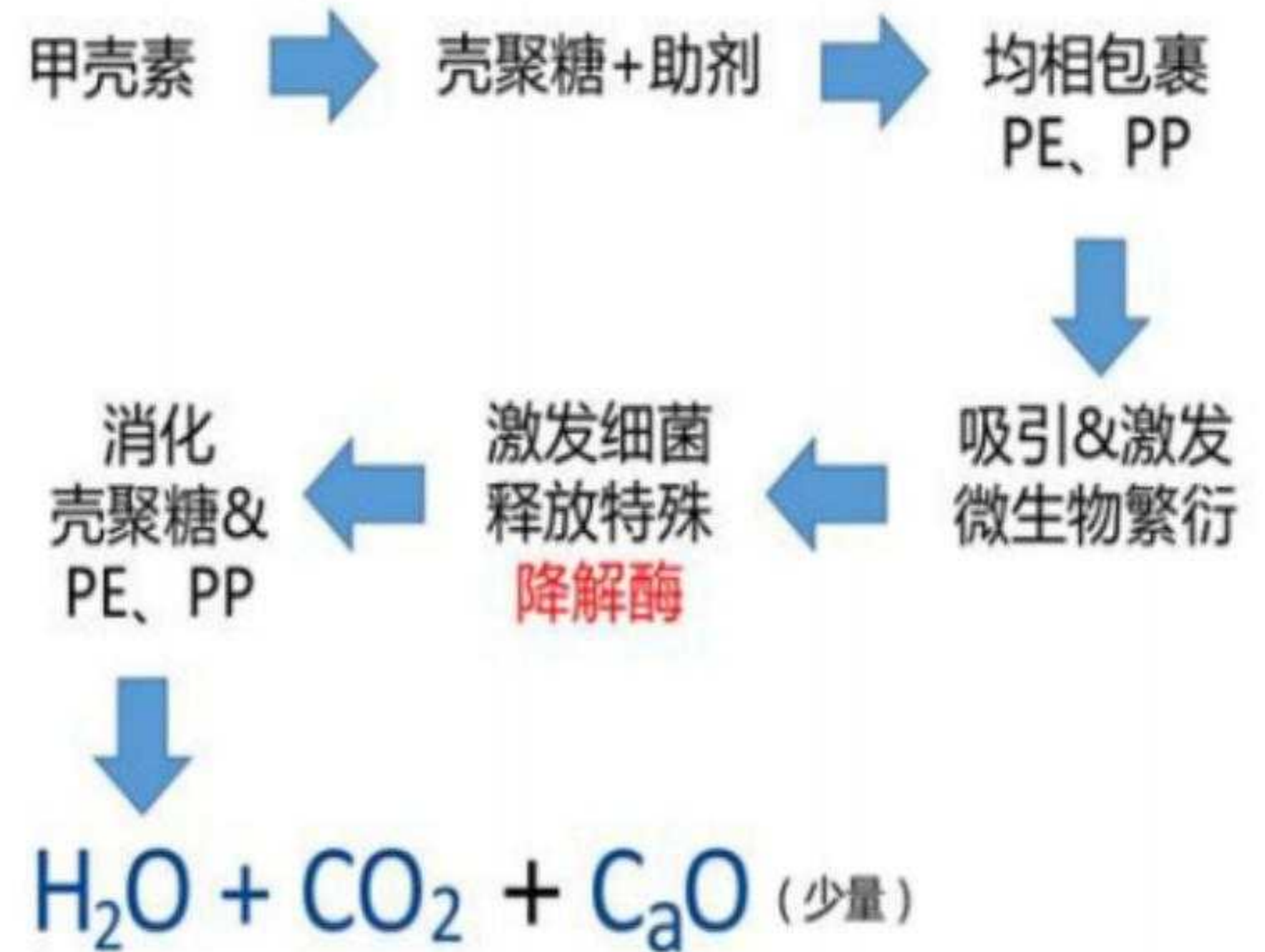
《Environmental Science & Technology》
《环境科学与技术》

Sinyar PACKING FILM Principle of chitosan biodegradable stretch film

Conclusion

In short, the chitin degradable biofilm contains components that can attract biomass, enabling insects and other microorganisms to digest the chitin degradable biofilm and decompose it into CO₂, H₂O and organics.

简而言之，甲壳素可降解生物膜含有能够吸引生物量的成分，使昆虫和其他微生物能够消化甲壳素降解生物膜并将其分解为CO₂、H₂O和有机物。

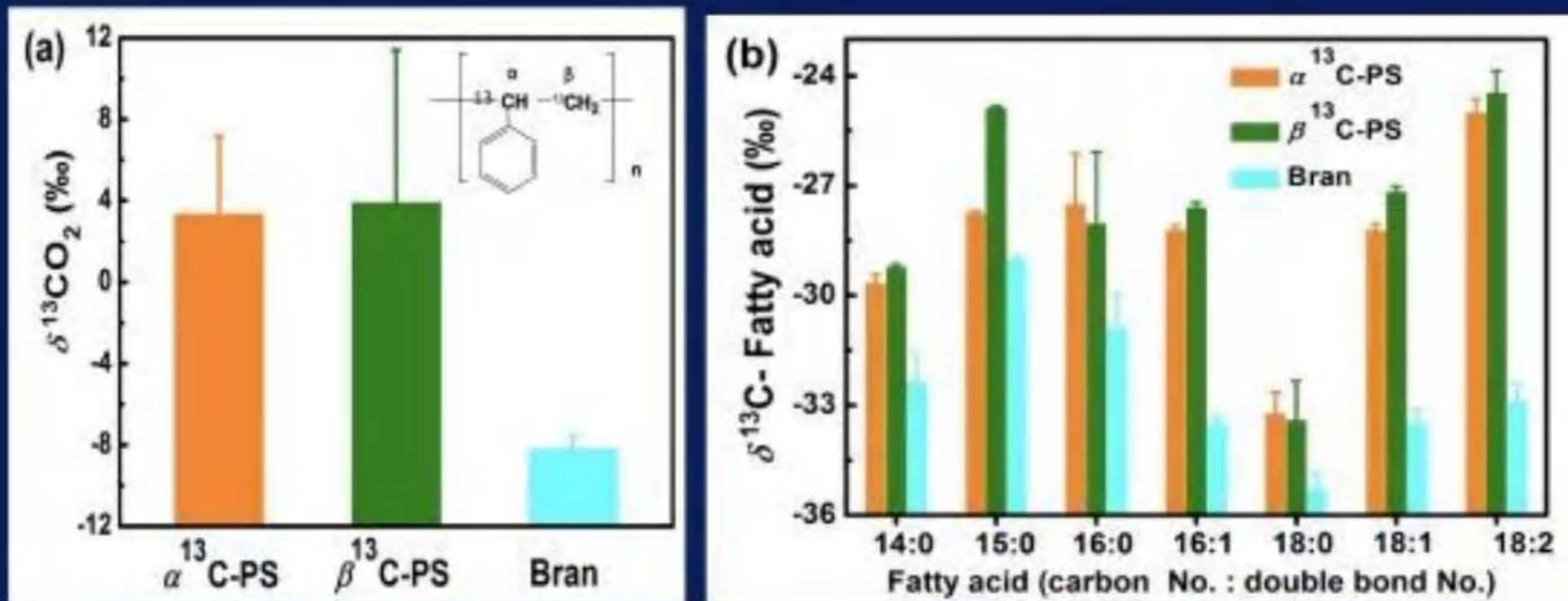




EXPERIMENTAL METHOD

Experimental method

^{13}C -PS同位素示踪：矿化为 CO_2 和同化为脂肪酸



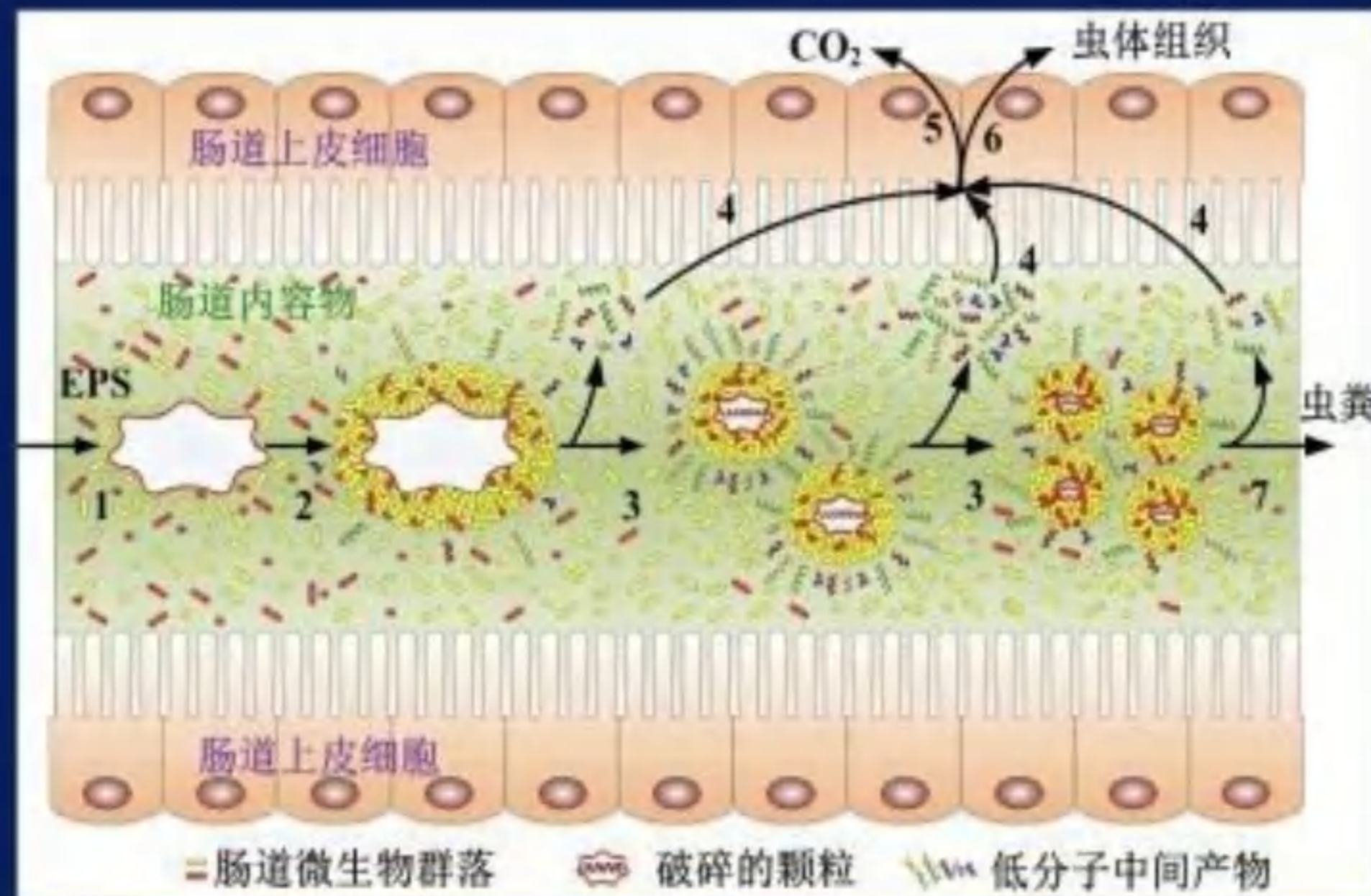
GC-C-irMS: Gas Chromatography-Combustion-isotope ratio Mass Spectrometry

A precise standard method in the study of biochemical mechanism is adopted, which is called isotope tracing method. It is carbon-13 labeled polystyrene and wheat bran that are fed to *Tenebrio molitor*.

采用了在生物化学机理研究当中的的一个精标准的方法叫做同位素示踪的方法。就是用碳-13标记的聚苯乙烯还有麦麸来喂食黄粉虫。

Experimental method

聚苯乙烯在虫肠内降解过程的示意图



The final results showed that *Tenebrio molitor* degraded and mineralized polystyrene into carbon dioxide, and it also assimilated and transformed into the body of the worm. So this fully proves that *Tenebrio molitor* can degrade polystyrene.

最后的结果证明，黄粉虫把聚苯乙烯降解矿化为了二氧化碳，同时它也同化转化成了这个虫子的肌体。所以这个就充分证明了黄粉虫能够把聚苯乙烯进行降解。



**COMPARISON OF
PBAT+PLA
AND
CHITOSAN STRETCH
FILMS**

Comparison of PBAT+PLA and Chitosan stretched films

PBAT+PLA

The stretch film of PBAT+PLA has a short life cycle and a degradation period of 3-5 months. In the process of using the product, it is easy to age and crack. If the PBAT+PLA stretch film is used to wrap the items, there may be a danger of the items being dumped.

PBAT+PLA的拉伸膜使用周期较短，降解周期为3-5个月。在使用产品的过程中，产品易老化开裂。如果使用PBAT+PLA拉伸膜来包裹物品可能会发生物品倾倒的危险。

Chitosan

The life cycle of chitosan stretch film is 24 months, and the degradation period is 12-24 months, which is more suitable for the needs of stretch film. Its' physical properties are better than PBAT.

The functionality of the stretch film does not change during 24 months of use. 甲壳质拉伸膜的使用周期为24个月，降解周期为12-24个月。物理性能比PBAT更好。

24个月的使用过程中，拉伸膜的功能性不会改变。

Comparison of PBAT+PLA and Chitosan stretched films

PBAT+PLA

PBAT+PLA stretch film is compostable degradable plastic, which needs to be degraded under certain composting conditions, and the implementation conditions are relatively high. Full degradation cannot be achieved in the natural environment.

PBAT+PLA拉伸膜是可堆肥降解塑料，需要在一定的堆肥条件下进行降解，实施条件相对较高。在自然环境中无法实现全降解。

The cost of PBAT+PLA stretch film is high, which is not recognized by many countries

PBAT+PLA拉伸膜成本较高，很多国家不认可。

Chitosan

PBAT+PLA stretch film is compostable degradable plastic, which needs to be degraded under certain composting conditions.

Full biodegradation can also be achieved under natural conditions.

甲壳质拉伸膜不仅在堆肥条件可以实现生物降解。不加任何人工干预，无需堆肥，自然条件下也可以实现全生物降解。

The cost of chitin stretch film is controllable.

甲壳质拉伸膜成本可控。

A dense, lush background of green ferns and white flowers, possibly roses, with a dark, moody lighting. The text is overlaid in the center.

2.

**RECYCLABLE
STRETCH FILM**

Recyclable Stretch Film Process

1. Sinyar packing film shall contact the third party company with GRS certification (e.g., Veolia, France) to provide PCR return master batch.
2. The stretch film containing PCR return components made by Sinyar packing film shall apply for GRS certification
3. Sinyar packing film sells stretch film containing PCR components to customers to realize their concept of environmental protection and recycling.



Recyclable Stretch Film Advantages



1. Compared with “traditional” garbage abandonment, recycling raw materials as much as possible helps to minimize crude oil and protect limited natural resources, reduce greenhouse gas emissions and realize the concept of environmental protection.
2. Recycling can prevent the waste of potentially valuable resources and reduce raw material consumption, thus reducing energy consumption, air pollution (self-waste incineration) and water pollution (self-landfill). In line with the national plastic reduction, double carbon policy, reduce carbon emissions.
3. Recycling plastic saves landfill space.

GRS Certification Recyclable Stretch Film

GRS Certification(Global Recycling Standard)

GRS is an international, voluntary and comprehensive product standard that regulates the content of recall and the chain of custody, society and environment of production and marketing.

Third-party certification requirements for environmental practices and chemical restrictions. The goal of GRS is to increase the use of recycled materials in products.



GRS Certification Recyclable Stretch Film

Reduce and eliminate all kinds of hazards caused by the production. **GRS standard is applicable to the recovered content of 20% or more.**

The product and applicable to any accepted recycled material, applicable to any supply chain. Applicants for GRS certification must meet the requirements.

Its traceability, **environmental protection, social responsibility, regeneration marks and general principles** of the five aspects of the requirements.



GRS Certification Recyclable Stretch Film

The new GRS certification is a three-tier system, divided into copper, silver and gold standards based on the recycling criteria for each product.

Gold standard requires products to contain 95 to 100 percent recycled materials;

Silver standard products contain 70% to 95% recycled materials;

Copper standard products contain no less than 30% recycled material.





3.
**BIO-BASED
STRETCH FILM**

Bio-based Stretch Film

The bio-based stretch film is widely used in the market of Japan and South Korea. The material is made of starch, sugarcane, shell and other natural materials.

Usually, add 10% ~ 30% of the ingredients of biological base products, raw materials are more environmentally friendly. It is currently applying for USDA Bio-based certification licensed by the United States Department of Agriculture.



Bio-based Stretch Film Advantages



1. The raw material is green and natural, reducing the use of crude oil from the source.
2. Small pollution to the ecosystem.
3. Compared with ordinary LLDPE stretch film, it can not only reduce carbon emissions but also absorb carbon dioxide.

Bio-based Stretch Film

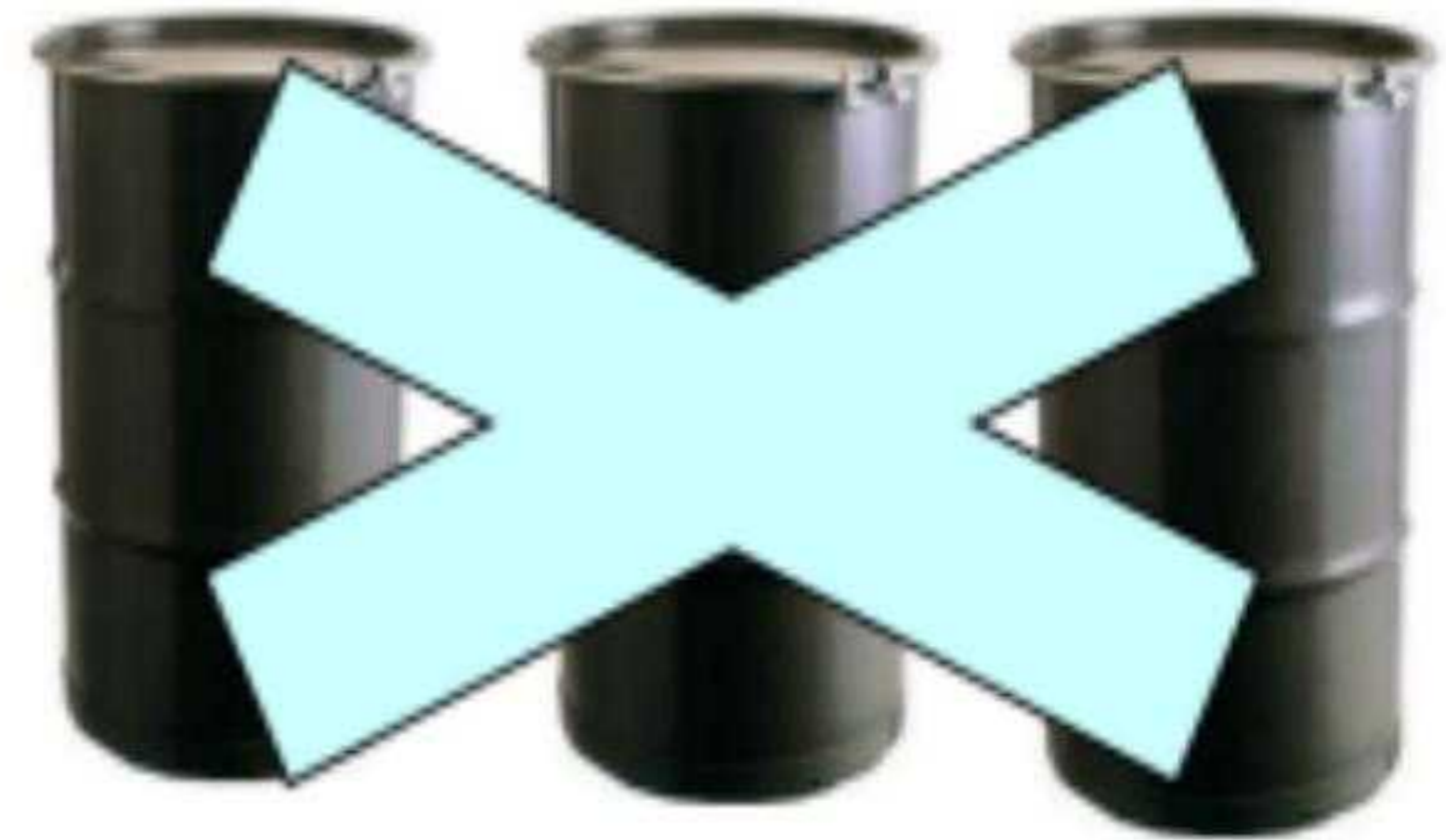
Comparison of CO2 emission

① Petrochemical PE ⇒ 4.5kg CO2 was discharged

② Green PE ⇒ 1.3kg CO2 was discharged

⇒ ▲ 3.2kg Reduction

Burning 1L of gasoline produces 2.3kg CO2. ▲ 3.2kg Reduction equivalent to about 1.4L of gasoline saved!!





Thanks For Watching

p o w e r p o i n t