ISBBB 2018 Circular Economy for Bioproducts Innovation

15th International Symposium on Bioplastics, Biocomposites and Biorefining

Guelph, Canada

# *Developing Biobased Polymeric Products for Slow Release of Water or Fertilizers in Agriculture*

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启恩科技 QIEN TECHNOLOGY

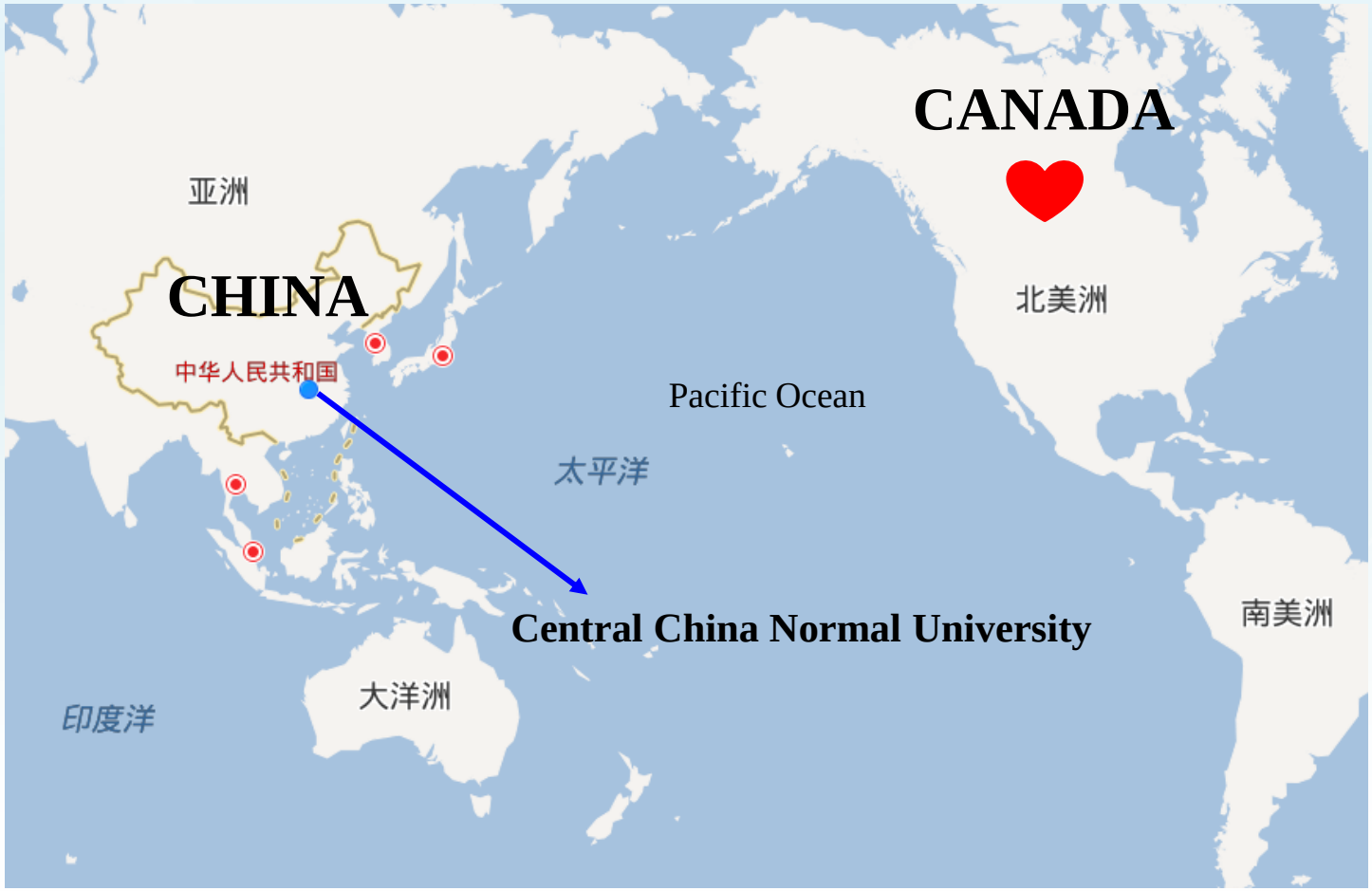



Photo from Baidu.com




China Normal University

about 30000 students

# Backgroud

High temperature on roofs of buildings




It is labor intensive to water plants on a roof

Image from Baidu.com


南湖天桥旁


房屋旁


道路绿化栏

该图片拍摄于2017年6月

The plants need water on summer

Photo from Baidu.com





Flower pots in Delta hotel on 2018-7-25




Cement Ground in cities

Photo from Baidu.com



Photo from Baidu.com

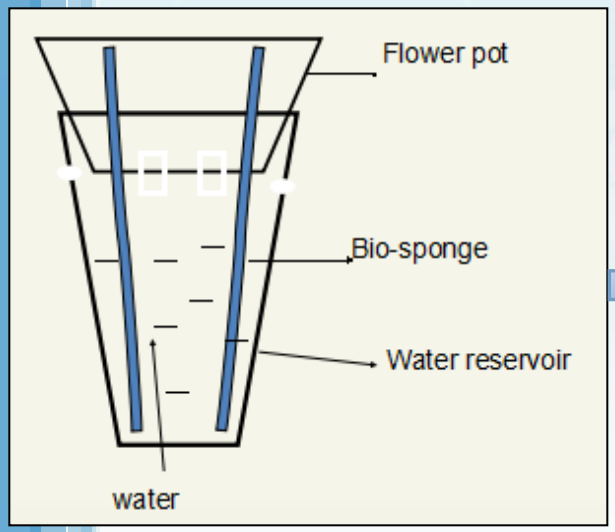
Desert

ISBBB 2018

# Our idea

Biobased polymer product

## Auto-watering flower tanks




Structure






## Special biobased sponges



700mm X450 mm X1.6mm

Sponge: Yugi@

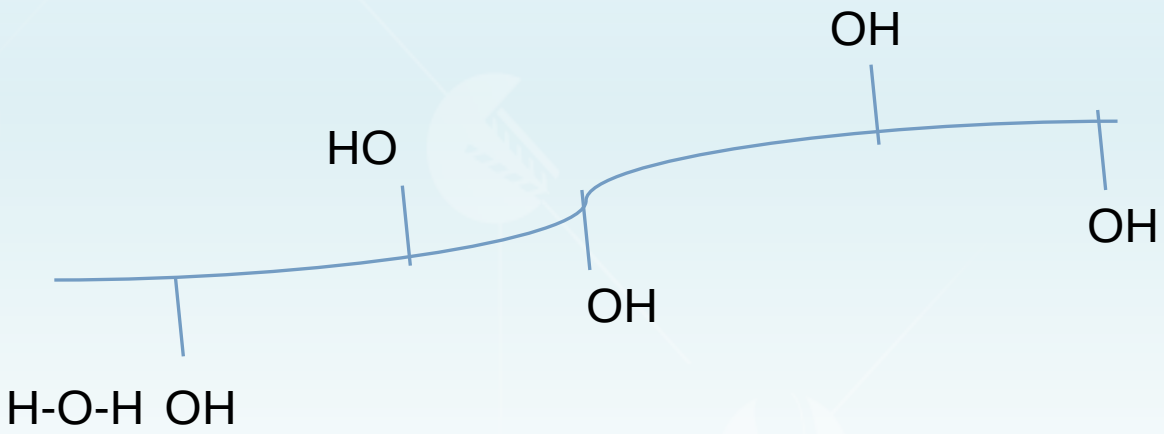
1. Can automatically make sense of the moisture of soil

2. Can automatically transport the water from one bottom to another

Yugi@ is the trademark of Wuhan Keyouji Co. Ltd.

# Strucuture

The reason for the slow-release of water by the sponge

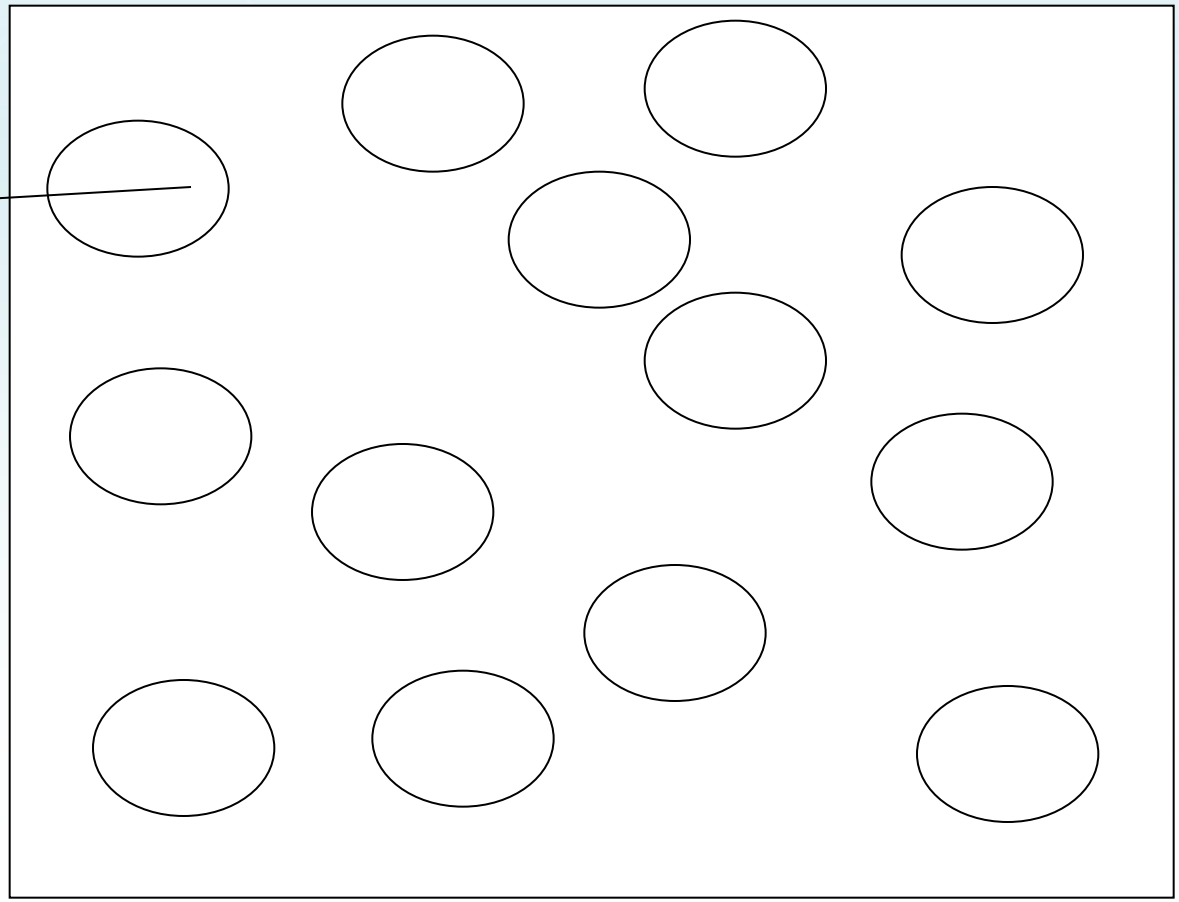



Very High Molecular weight



Special polysaccharide is taken from forest and modified (biobased content : 90%)

# Foam structure

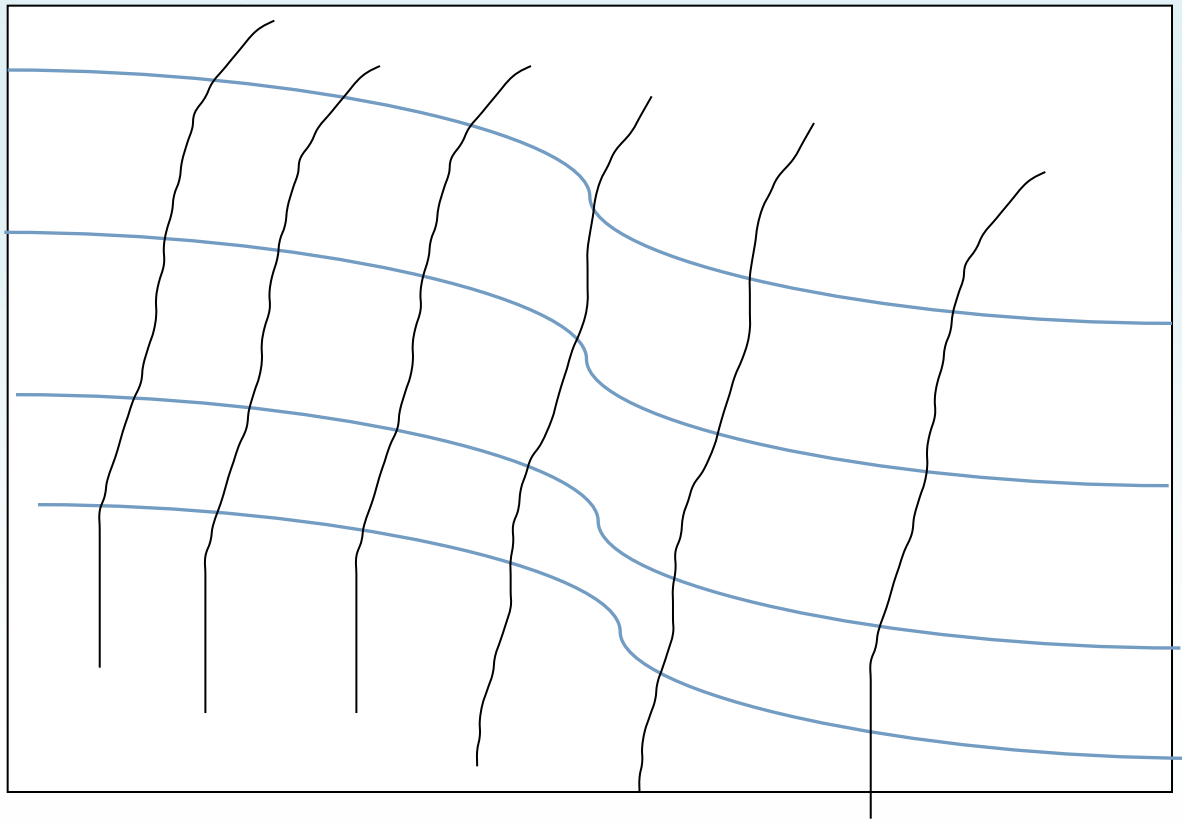






The foam structure can easily absorb water

# The reason for the slow-release of water by the sponge



Linked polymers



Photo from Baidu.com

The cross-linked structure increases the strength of the sponge-(Yugi@ sponge)

# How to prepare the Yugi@ sponge ?



Pop Corn technology

Photo from Baidu.com



extrusion

# The water uptake properties of the special sponges





Cotton towel water uptake: 300%



700mm X450 mm X1.6mm

Yugi@



Water uptake: 640%







Prepare special flower tanks using the Yugi@ sponge


eggplant
Water tank


Yugi@ sponge






灭火器箱



Pepper



Sensitive Plant

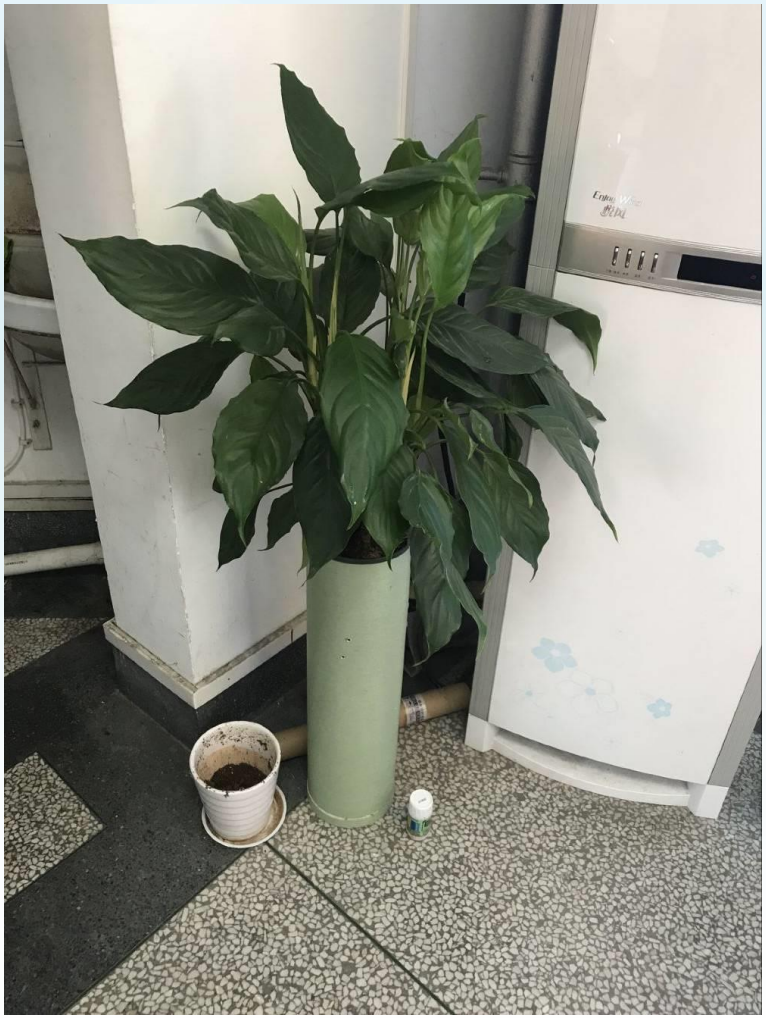


Flowers



AGLAONEMA MODESTUM





6 months in a chemistry office



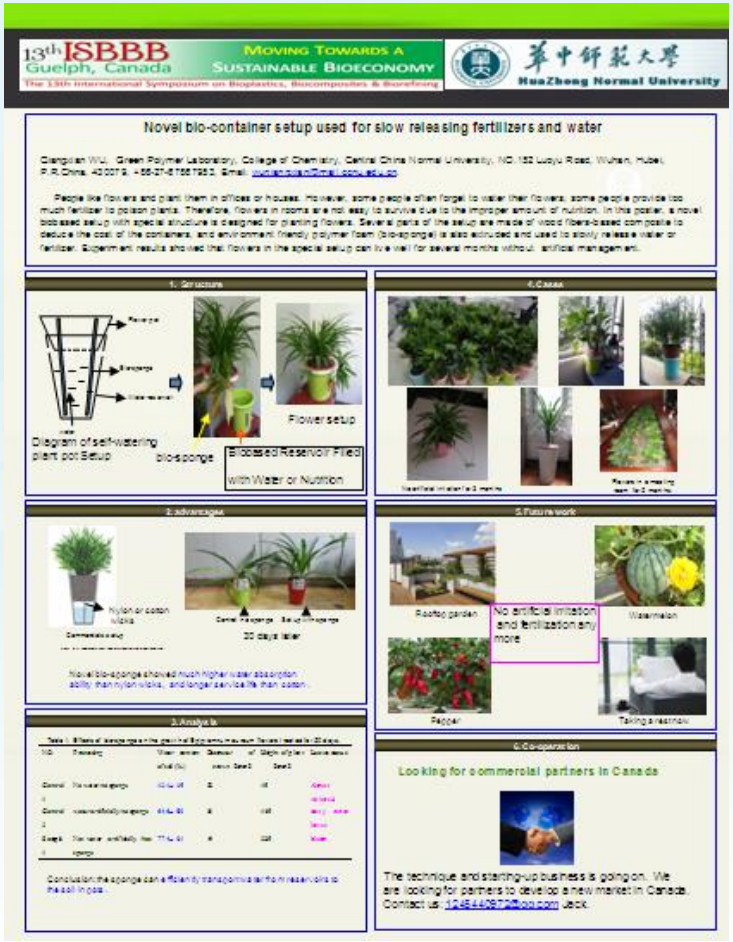
4 months outdoor



AGLAONEMA MODESTUM

1 year in a chemistry office

ISBBB 2018




13th ISBBB Guelph, Canada
Moving Towards a Sustainable Bioeconomy
The 13th International Symposium on Bioplastics, Biocomposites & Biorefining

We have presented a poster in 2014 ISBBB

華中師範大學 HuaZhong Normal University

# Future works



Soy bean organic fertilizer



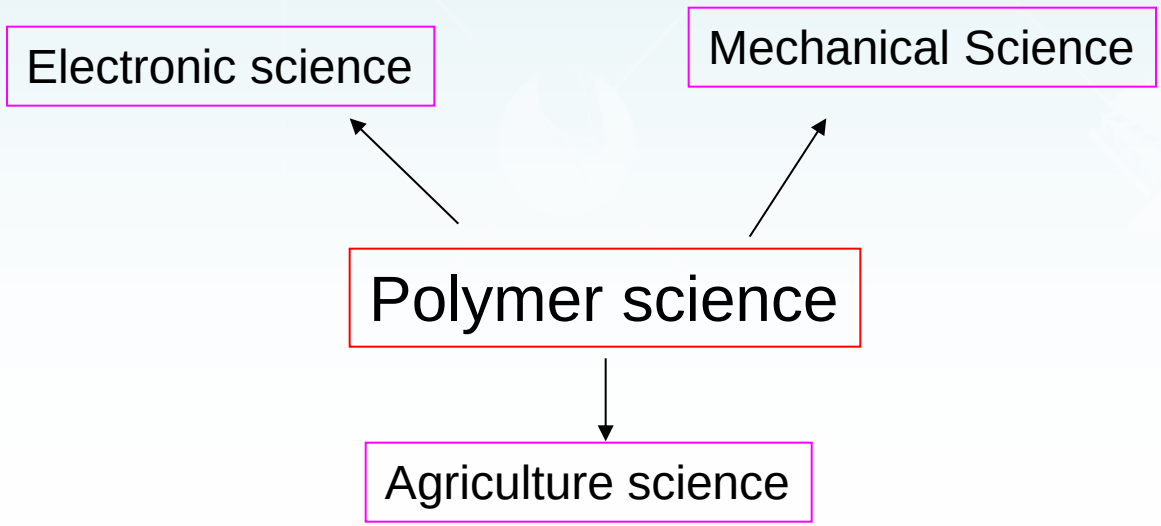
Urea fertilizer

Fertilizer



# Our task

Create some ideas using multidisciplinary knowledge and transfer the idea into business

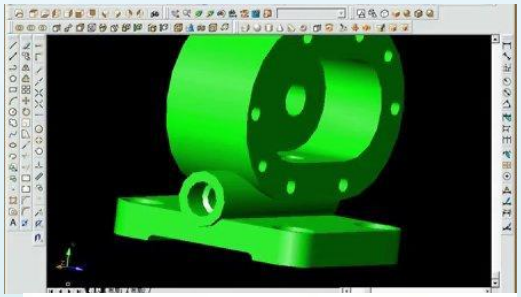


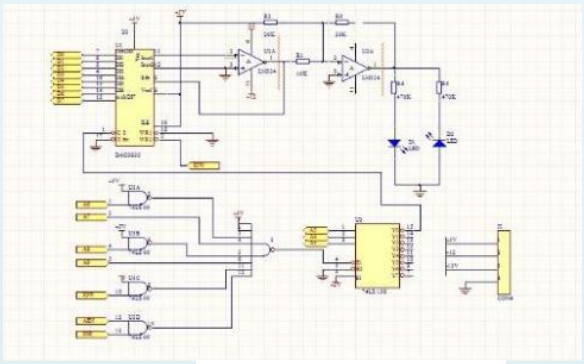
# Our Group



1. Novel polymer processing machines are designed in our lab according to the requirement of our customers and our multidisplinary knowledges.

2. The novel machines are manufactured in large scale and sold in the companies which co-founded by our students and researchers.





AutoCAD

Protel
Making Electronic Design Easy™



polymer
聚合物

Multidisplinary technology

# Novel products

Labor saving

Easy to move

Energy saving

Special polymer inside




**Mini compression molding machines**

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# 密炼机

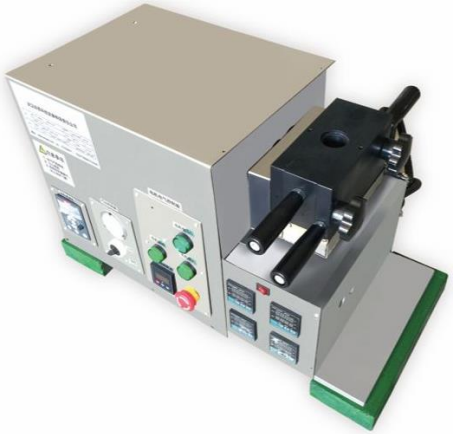
转动作用下将橡胶、
用微型密炼机采用
热升温快、控温精度
，拆卸快捷方便，清
少，加料容易，不堵
速无级调速，转速平

最新产品，进行了多
高分子混合设备的理
等，QE系列实验用可
照下方方式联系本公

AMETER

| 温度显示 | 最大转速 |
| --- | --- |
| 数字/1℃ | 100RPM |
| 控温范围 | 最大扭矩 |
| 40-300℃ | 100NM |





**Intensive Mixer（70 mL)**




Safety and environmental protection

ISBBB 2018

启恩科技 QIEN TECHNOLOGY

华中师范大学 HUAZHONG UNIVERSITY

# 启星® 注射机

- 轻(约120公斤)，容易搬运
- 小，桌面置放
- 两国标，样尺寸大
- 几乎无表面气痕
- 整机拼版式，部件可换性高
- 气动，不漏油



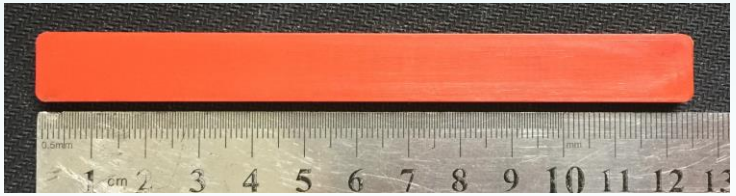




PP bending specimen
80*12.7*3（ASTM D 638）



PP tensile specimen
63.5*3.18*3（ASTM D 638）



Vertical burning standard spline
125×13×4mm

## Micro-independent injection molding machine

Wuhan Qien Science & Technology Co., Ltd

华中师范大学 HuaZhong Normal University



| 型号 | 功率 (kW) | 电源电压 (V) | 外形尺寸 (mm) | 锁模力 (吨) | 温度显示 (精度) | 最大气压 (MPa) | 射出压力 (MPa) | 塑化能力 (克/次) | 控温范围 (℃) | 功率 (kW) | 气动装置 | 模具 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M1200 | 120 | 220V | 400L×580W×300H | ~80 | 数字/1℃ | 0.8 | 125MPa | 8克/次 | 40-300 | 1 | | |

武汉启恩科技发展有限责任公司

座机/传真：027-87780051　邮箱：whqien@163.com　QQ：757564871

客服热线：15527786895　技术咨询：18602755404

Wuhan Qien Science & Technology Co., Ltd

**Micro twin screw openable extruder**

# Laboratory team introduction at this stage

Experimental assistant：3

Technician: 1

Electronic Mechanical Engineer：1

Laboratory secretary：1

Master graduate student：6

PhD student：2



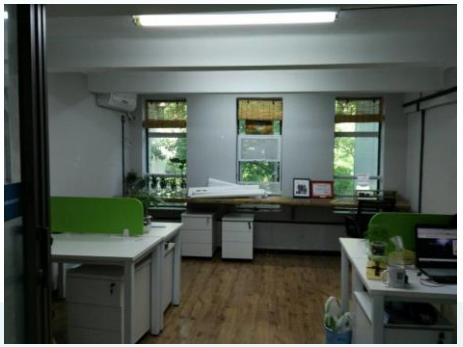
Polymer processing center, room space 120 $m^2$

Qien Keji Company-factory, 250 $m^2$



Factory

Keyouji starting up Company, 40 $m^2$



Office

# 4、Acknowledgement

Thanks to the **National Natural Science Foundation of China** for funding!

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NSFC

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