

# 工業技術研究院

Industrial Technology  
Research Institute

## PEF與其相關材料技術發展

汪進忠

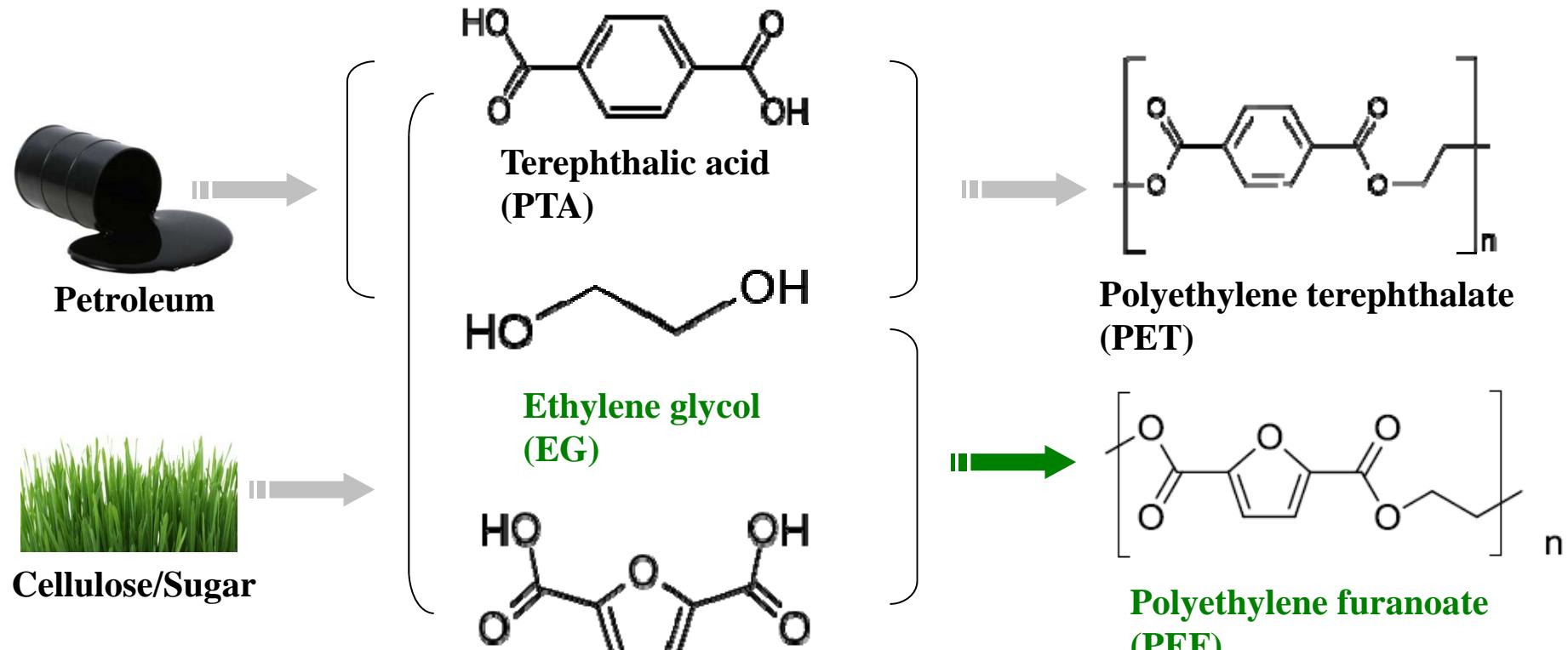
工研院材化所/先導製程與應用研究室

03-5732421

[genezonewong@itri.org.tw](mailto:genezonewong@itri.org.tw)

Industrial Technology Research Institute, Taiwan

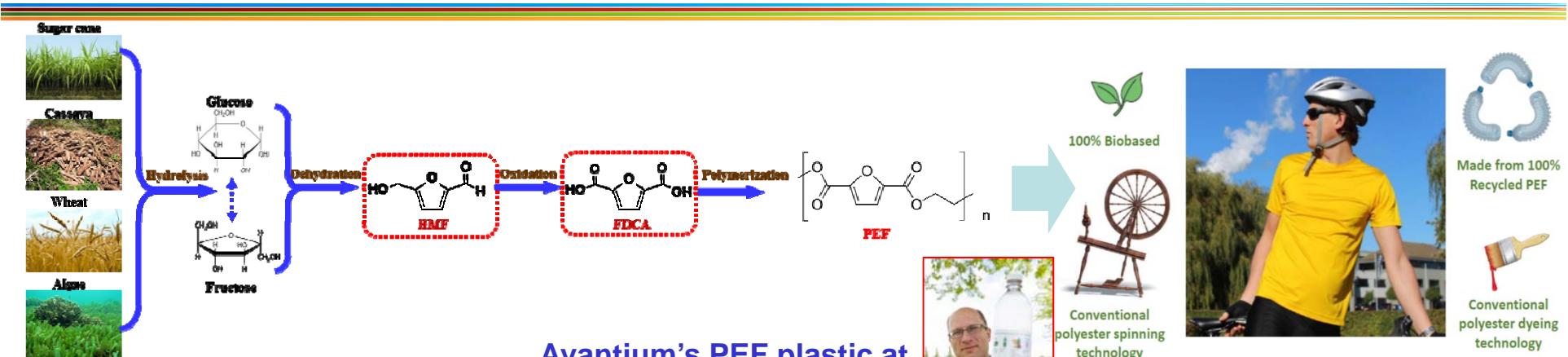
# Polyethylene furanoate (PEF)



	O <sub>2</sub> (barrier)	CO <sub>2</sub> (barrier)	H <sub>2</sub> O (barrier)
PEF	0.0107	0.026	180
PET	0.114	0.49	370

Macromolecules 2015, 48, 2184–2193

# Current Status of PEF

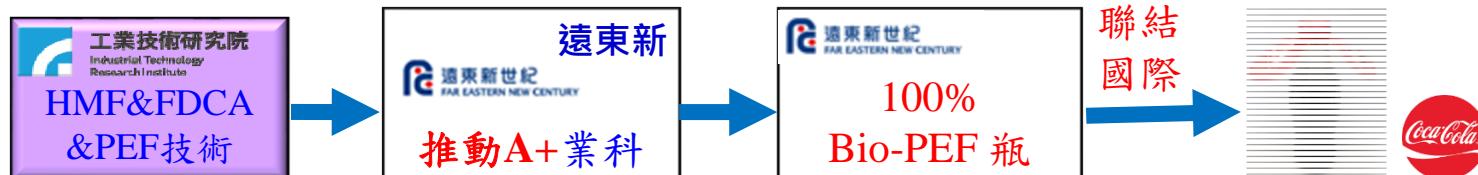


Avantium's PEF plastic at  
the EXPO 2015 in Milan



2009	2010	2011	2012	2013	2014	2015	2016	2017	2020
New Generation of Biobased Polymers	YXY pilot plant officially opened	Sign partnership with <b>Danone</b> (PEF)	€36M Investment from Swire Pacific, The Coca-Cola Company, Danone and ALPLA	FDCA production plant for <b>Mitsui</b>	<b>FDCA</b> <b>50,000 t/y</b>				

YXY pilot project      Sign partnership with **Coca-Cola** (PEF)      Sign partnership with **ALPLA** (PEF)      40 tons of PEF pilot plant in Geleen      **BASF** and Avantium establish JV  
Raising financing round of €20 million from PMV      FDCA capacity 300,000~500,000 t/y

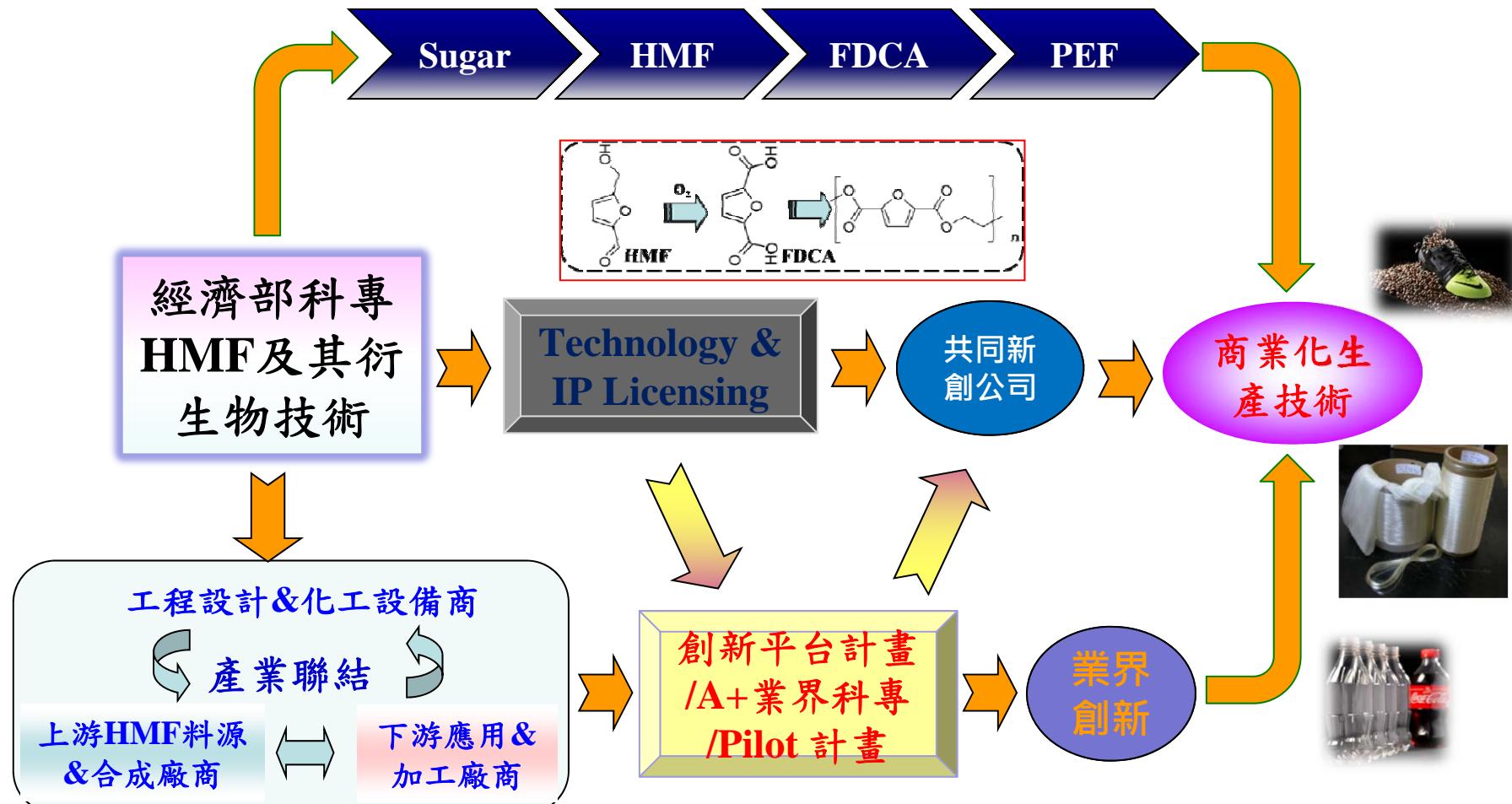


技術授權

國內自主技術

100% PlantBottle 產業鏈

# PEF產業鏈之產業聯盟推動規劃



# HMF試產能力---200 L (reactor)



**Features of the HMF production system**

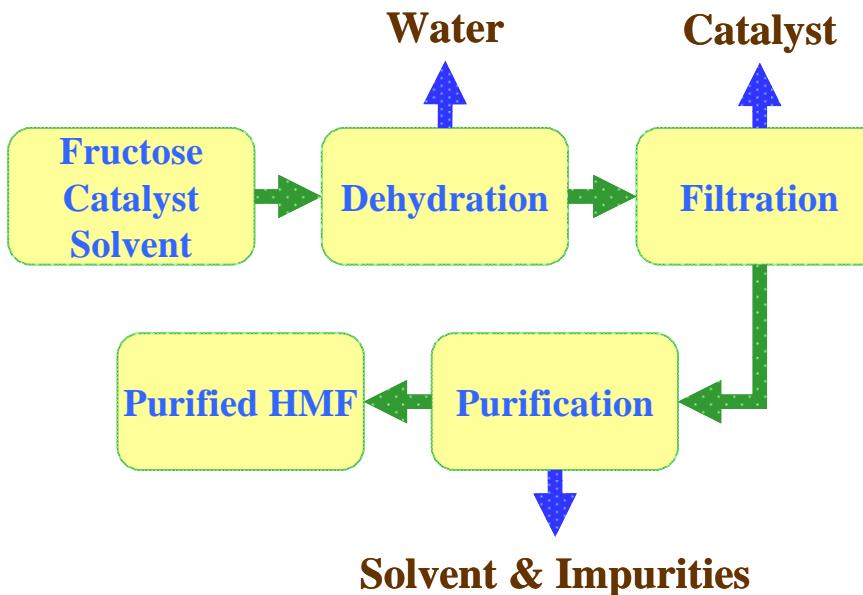
- Vessel volume : 200 L
- Vacuum (~0.25 torr)
- Max Temperature (~250°C)



Crude HMF



Purified HMF



Sample	Yield (%)	Purity (%)
Crude HMF	85	30.7
Purified HMF	60	>99

production: 15~20 Kg/batch  
(half filled tank)

# 合成FDCA氧化反應系統---pilot scale

100L Titanium reactor



Titanium condenser



Vent gas treatment



Filtration system



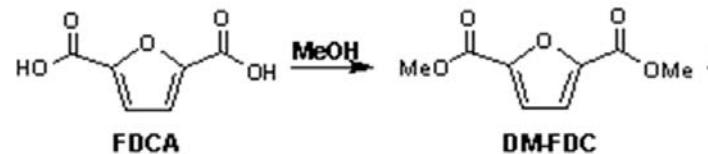
## Features of the pilot oxidation system

- High Pressure (~50 bar)
- High Temperature (~300°C)
- Anticorrosive

批次FDCA試產能力：  
cFDCA產能 $\geq$ 4 ~5Kg/批  
cFDCA純度 $\geq$ 98%，  
批次產率~75%，



# DMFDC小量試產系統



Crude DMFDC  
>97%



↓  
Distillation

Purified DMFDC  
>99.5%



Yield : 80-85%  
Purity of crude DMFDC : 90%~97%  
Purified purity of DMFDC >99.5%



謝謝聆聽

敬請指教