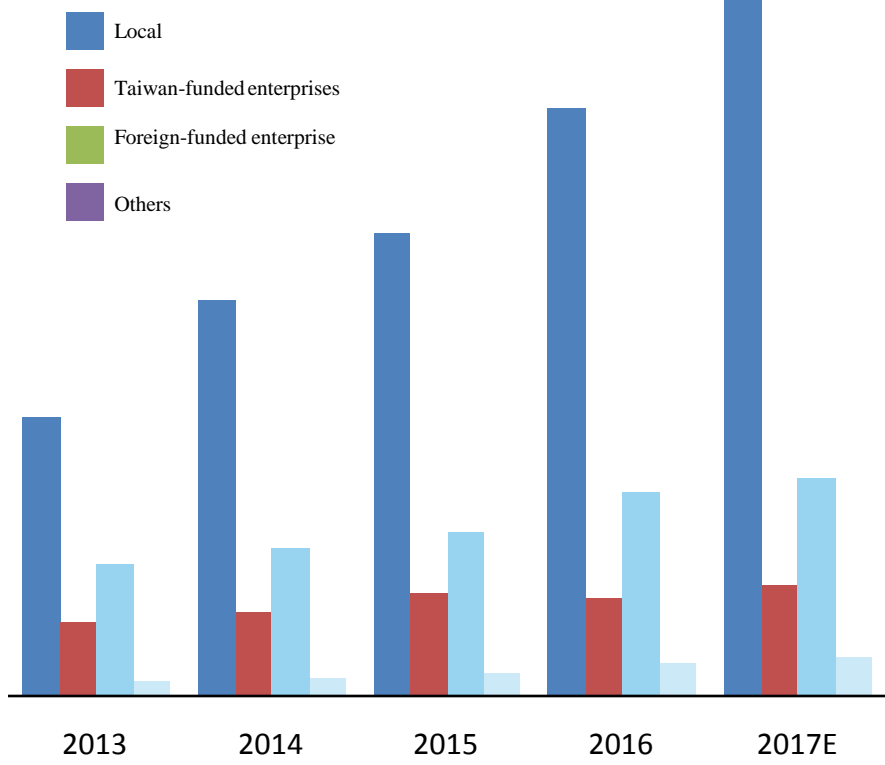
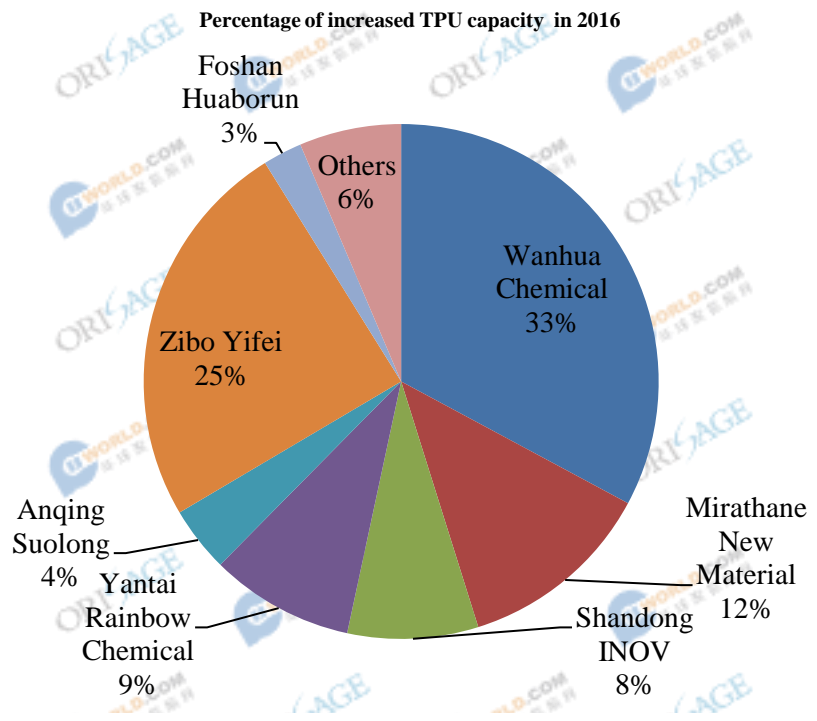


# TPU Industry Was Experiencing Fierce Competition; in 2016, Local New Enterprises Engaged in Market Competition

Comparison of TPU output by TPU manufacturers during 2013-2017 (unit: ton)



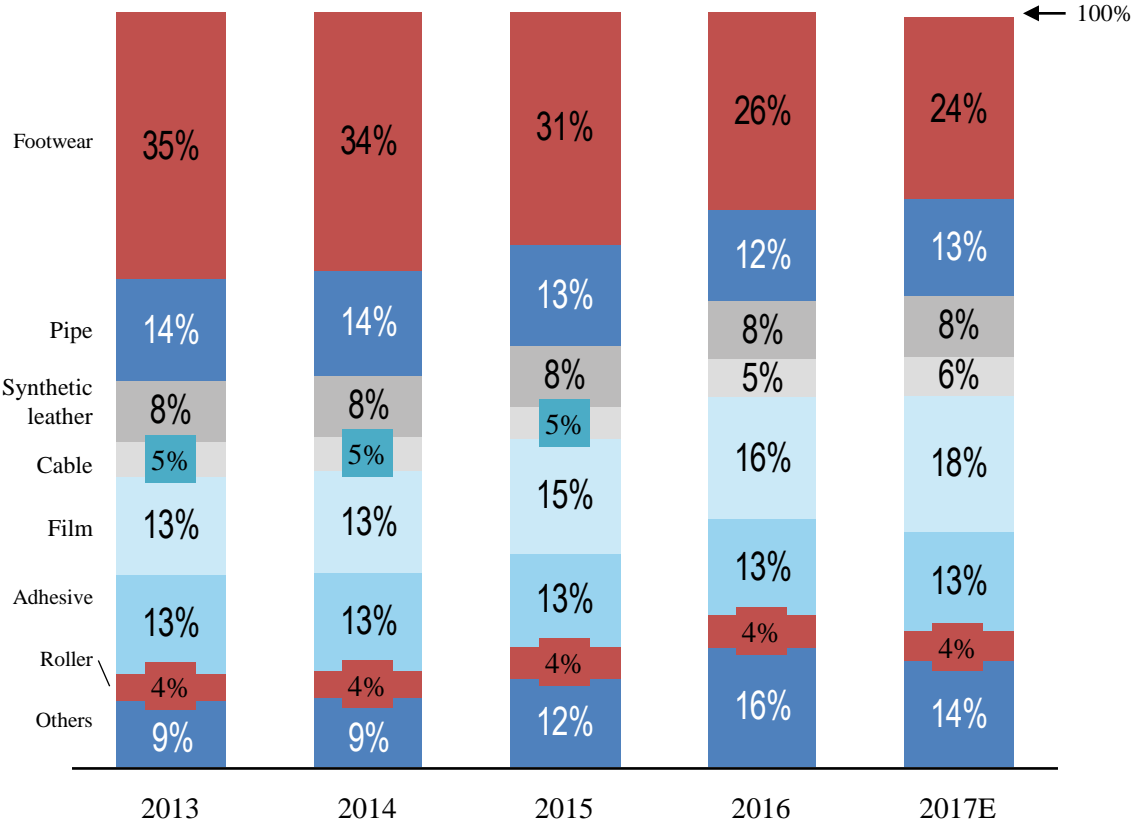
In 2016, productivity growth in China is about 22.6%. In addition to new TPU manufacturers, 40,000t/y production expansion by Wanhua Chemical is an obvious increase.



Notes: in figure 1, others mean Hong Kong enterprises and joint ventures

# Consumption by Downstream Industries Continue to Grow, Emerging Industries Witness Gradual Rise and Consumption by Traditional Industries Show No Decline

Industrial proportion of TPU consumption by downstream during 2013-2017 (unit: %)



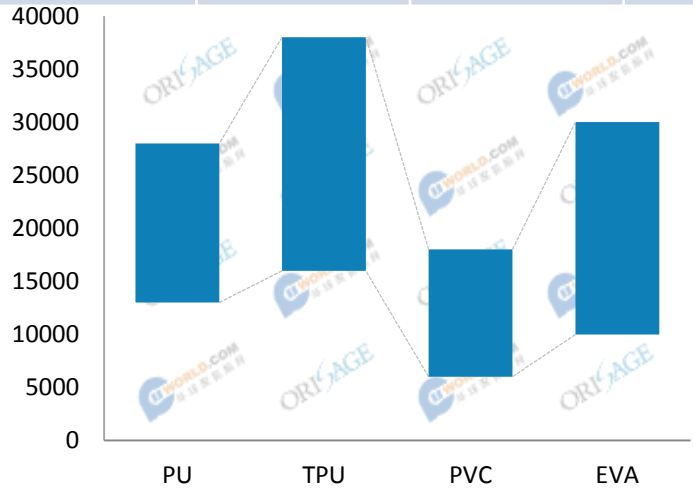
- Among downstream industries, film industry grows rapidly. This is due to great efforts that film manufacturers have made in expanding downstream market as well as their own product technical upgrading and innovation.
- Though TPU consumption by shoe material industry witness a certain growth, but the proportion of TPU consumption by shoe material industry in the whole shows a decrease.
- Film and cable market are expected to have good performance in the future and traditional industries may witness flat growth.

Data resource: Orisage Consulting Co., Ltd.

# In Spite of Development Bottleneck for Footwear Industry, TPU Witness An Increasing Growth Facing with Both Competition and Opportunity

Product/performance	Technical maturity	Price	Market development level	Wear resistance	Elasticity	Transparency	Comfort
TPU foaming	▲	▲	▲	★	★	★	★
EVA foaming	★	☆	★	▲	☆	☆	☆
PVC foaming	★	▲	▲	▲	▲	▲	▲

Comparison of sole raw material price in China footwear industry (unit: RMB/ton)



Sluggish footwear market directly determines the price of its raw materials. Currently, all raw material prices are low. Market raw material competition is also fierce. Product performance and price, manufacturers' lead-time and payment days all determine the market trend.

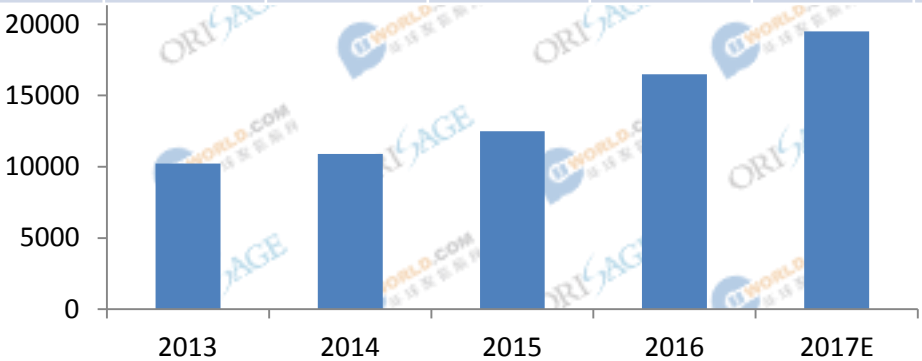
With the maturing TPU foaming technology, it is expected to gradually occupy the former EVA and PVC market.

Data resource: Orisage Consulting Co., Ltd.

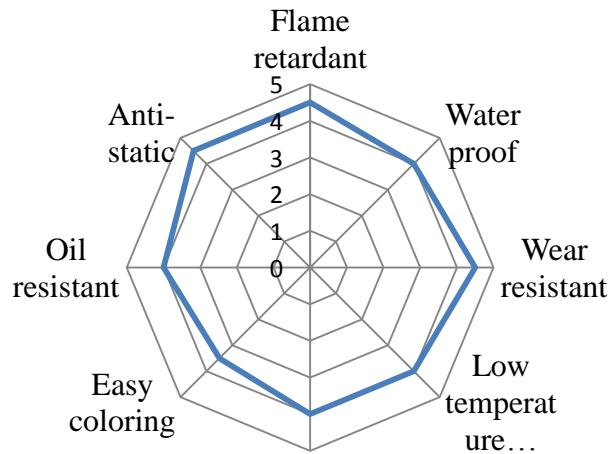
Notes: ★good; ☆ordinary; ▲poor

**Low-end Market of Cable Industry Is Sluggish, So It Transfers to High-end Market.**

Raw material	Processes	Elongation	Strength	Hardness	Price	Scrap
TPU	Extrusion	High	Medium	0A-80D	High	Recyclable
PVC	Extrusion	Low	Low	80D-15R	Low	Great pollution
Rubber	Vulcanization	High	High	20A-90A	Medium	Non-recyclable



**Modification requirement of cable industry for TPU**



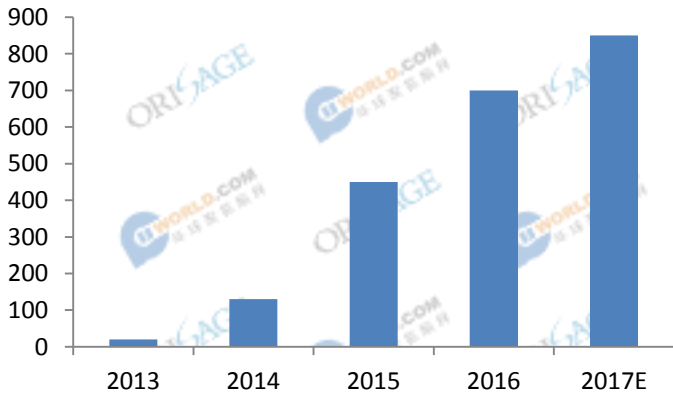
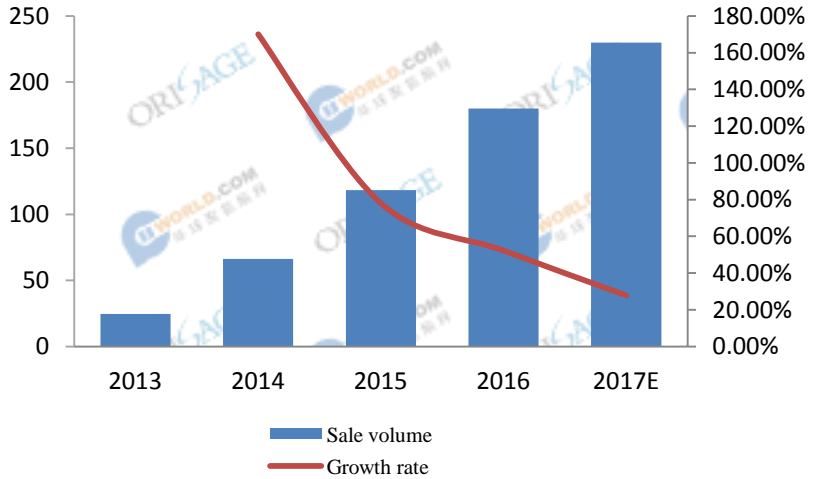
**Emphasis of TPU modification requirement by cable industry: (see the notes)**

Notes: modification requirements emphasize: 5. high; 4. relatively high; 3. general; 2. relatively low; 1. low.

**Emergence of Wearable Equipment Brings Business Opportunity to TPU.**

Raw material	Wear resistance	Oil resistance	Comfort	Possibility of allergy	Shaping	Stain resistance
TPU	★	★	☆	★	▲	★
Silica gel	▲	▲	★	★	★	☆
TPSIV	☆	▲	★	★	☆	☆

2013-2017 Wearable device sales volume (unit: RMB100 million)



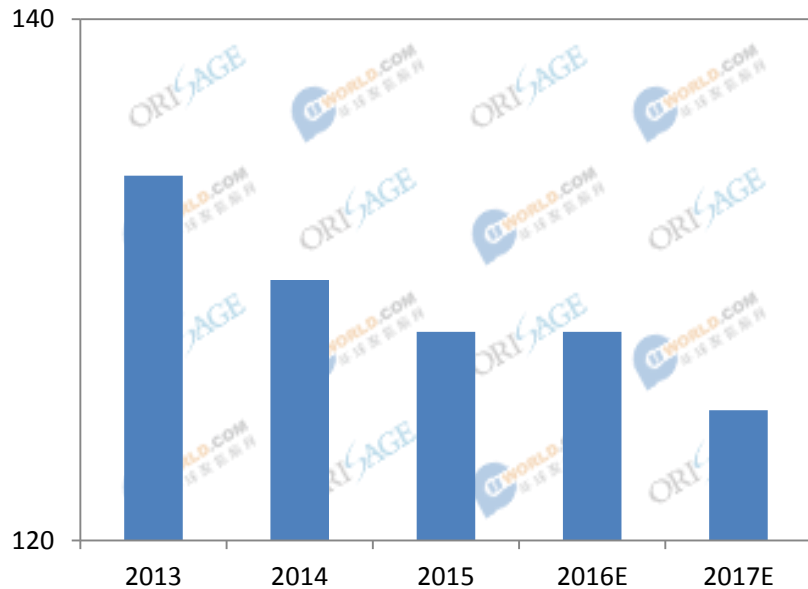
Notes: ★good; ☆ordinary; ▲poor  
Information source: China Information Network

Data resource: Orisage Consulting Co., Ltd.

## Whether TPU Can Totally Substitute PVC in Medical Industry?

Currently, medical consumables is the largest consumer of TPU in medical industry, however, it also faces fierce competition.

**Production of transfusion bag during 2013-2016 for medical treatment in China: (unit: 100 million bags)**



Information source: China Information Network, Orisage Consulting Co., Ltd.

### Raw material, performance and product type of medical TPU

Product type	Raw material	Performance
Aliphatic polyether-urethane	HMDI/HDI, BDO,PTMEG	Biocompatibility, strength, processibility
Aromatics polyether-urethane	MDI,BDO,PTMEG	Solvent resistance and high temperature processibility
Aliphatic polycarbonate urethane	HMDI, polycarbonate diol	Resistance to oxidative degradation, biostability
Aromatics polycarbonate urethane	MDI, polycarbonate dioland BDO	Biostability, biocompatibility
Aromatics polyester-	MDI,BDO	Strength ratio PTMEG

Data resource: Orisage Consulting Co., Ltd.