

# ***POF for Higher Speed; Technology Status***

**p1394.b Honolulu HI Aug/6/1997**

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**Information about POF(WWW) ; <http://www.mrc.co.jp/dep/pofeskae/comme/comme.htm>**

***MRC; Mitsubishi Rayon Co., Ltd.***

# Outline

- ◆ Introduction
- ◆ Advantages of POF
- ◆ Technology status
  - ◆ Low NA SI-POF
  - ◆ GI-POF
- ◆ Roadmap

# What's POF?

- ◆ “POF” = **P**lastic **O**ptical **F**iber
- ◆ **Very Large Core** (= 1mm) Optical fiber
  - ◆ Reduce connection cost
  - ◆ Enable amateur installation
- ◆ **Plastic core**
  - ◆ Flexible, Low cost and Massproducible
- ◆ **Core material ; General purpose plastic**  
= PMMA(**P**oly **M**ethyl **M**eth**A**crylate)

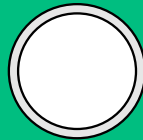
# Relative fiber size



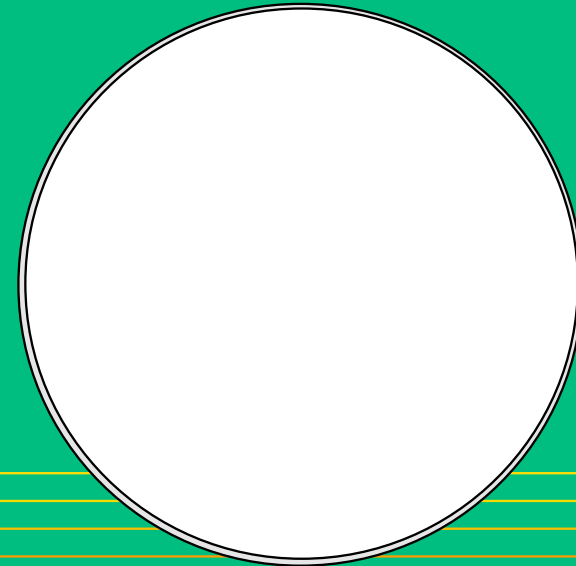
Singlemode GOF



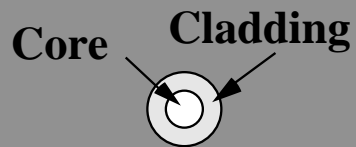
62.5/125  
Multimode GI-GOF



200/230  
Polymer Cladding GOF



980/1,000 POF

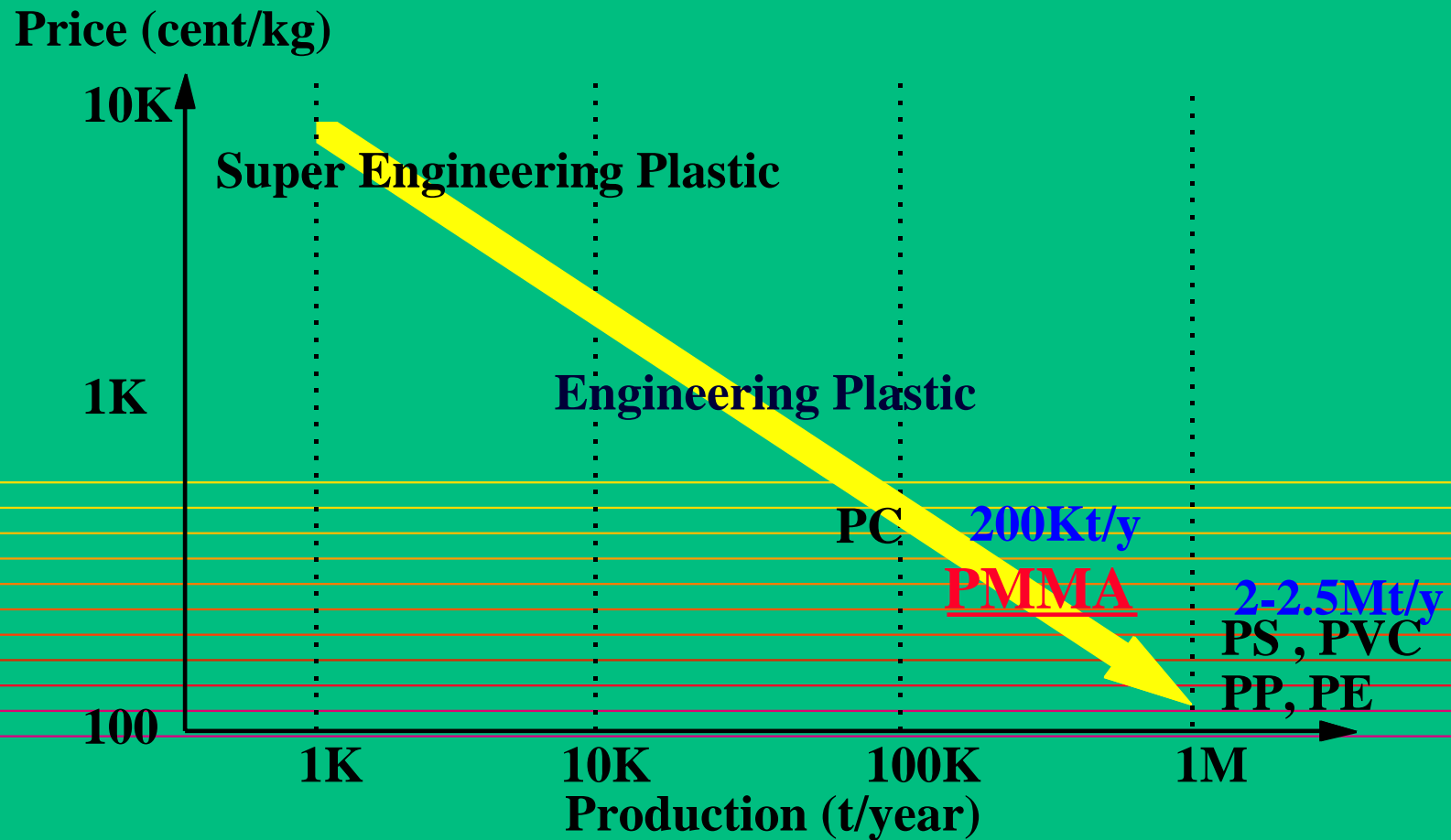


Core Diameter / Cladding Diameter

# **PMMA; Core Material**

- ◆ **General purpose plastic**
- ◆ **Worldwide production; 1000,000 t/y**
- ◆ **No special grade for POF**
- ◆ **MRC has top share of PMMA and MMA(raw material) in Japan**

# Mass production effect on price of plastics

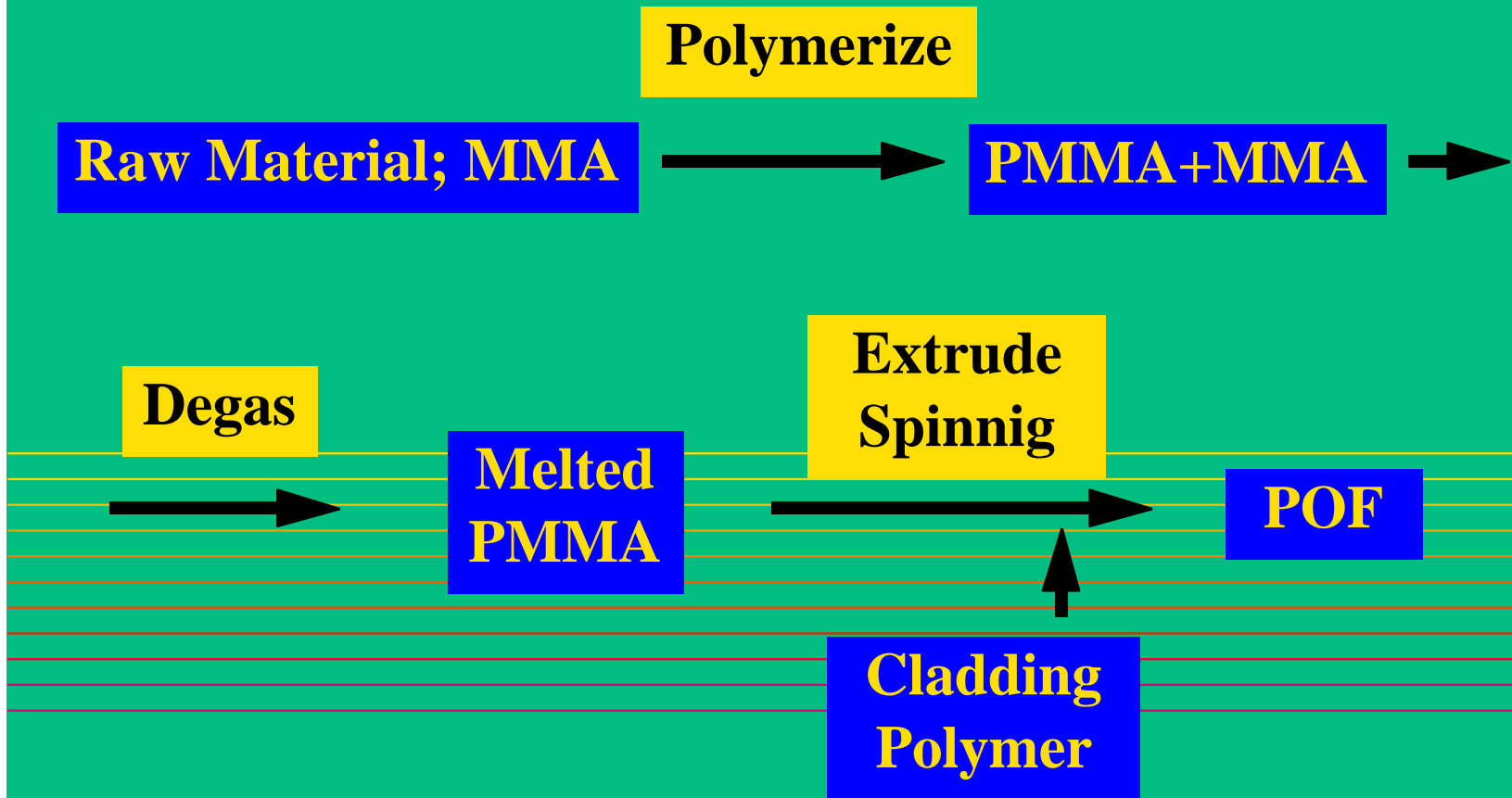


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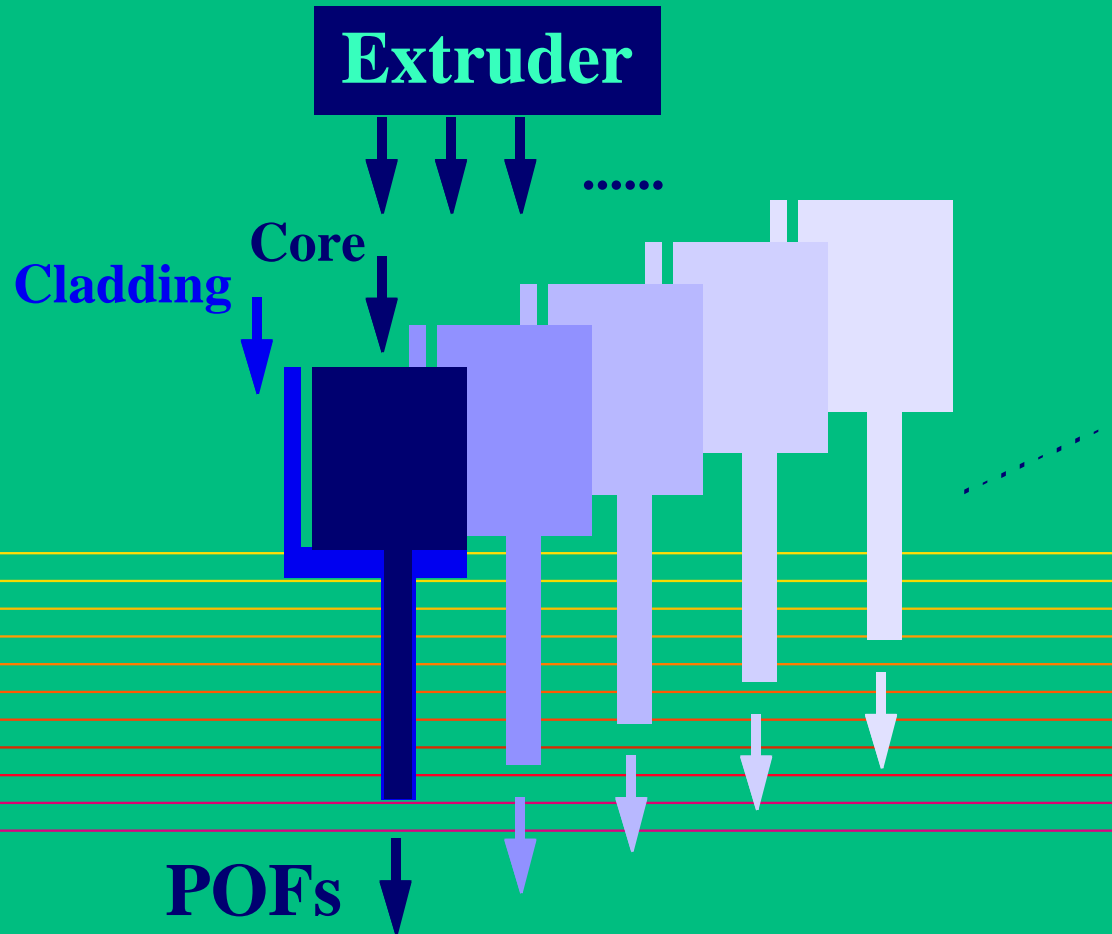
# Manufacturing process

- ◆ Continuous closed process from the raw material to the fiber
- ◆ Parallel conjugate spinning
- ◆ Comparable producing speed with GI-GOF
  - ◆ cf. Drawing speed of GI-GOF  $>2.5$ (m/sec)

# Continuous process



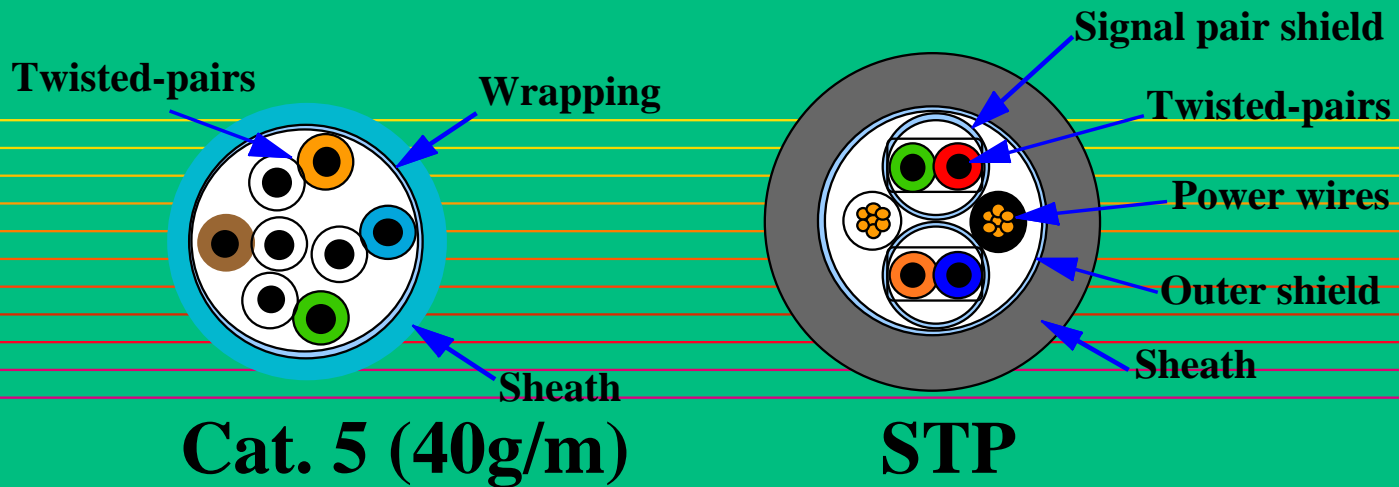
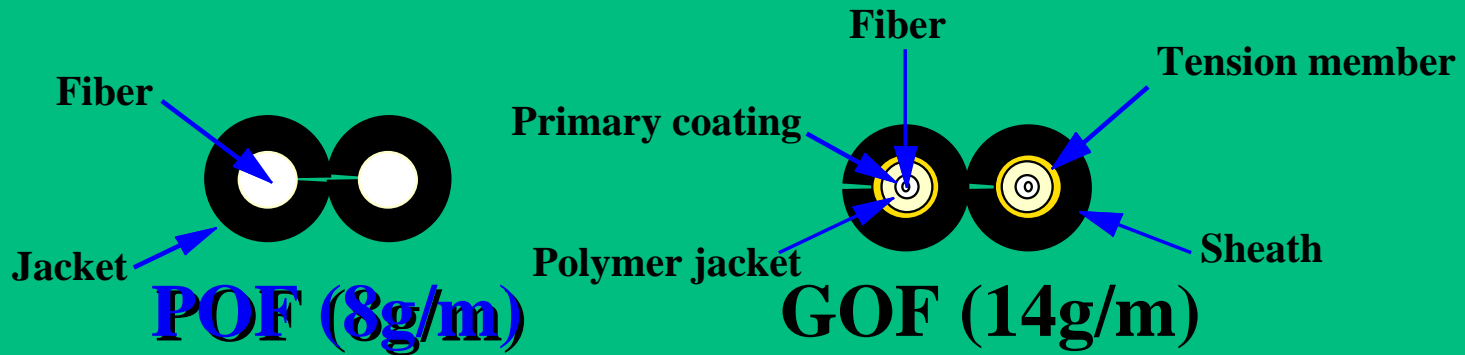
# Conjugate spinning



# Advantages of POF

- ◆ **Low cost**
  - ◆ **Fiber itself**
  - ◆ **Termination**
  - ◆ **Simplicity**
- ◆ **Safety**
- ◆ **EMI Immunity**

# Simplicity

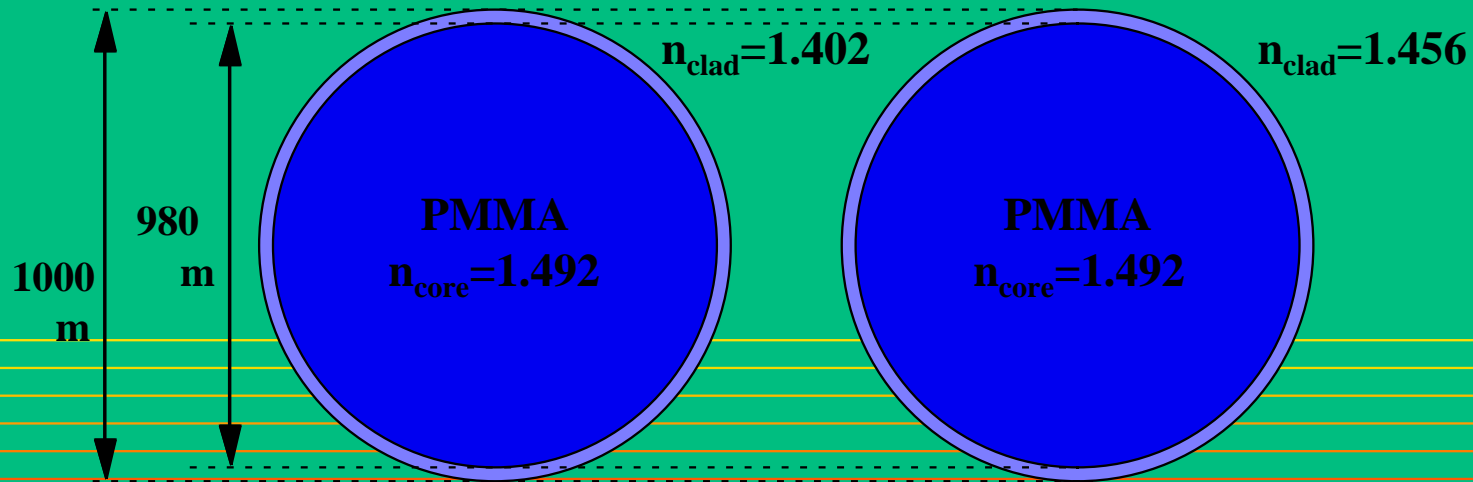


# Technology status

- ◆ **Low NA SI-POF; ESKAMEGA™**
  - ◆ Satisfies the ATM Forum 156Mbps@50m spec.
  - ◆ Multi vendor environment
  - ◆ S100 Compatible (@50m)
  - ◆ S200 (@50m) Under study
- ◆ **GI-POF**
  - ◆ ESKAGIGA™ Sample Distribution '95-
  - ◆ **New Fiber**
    - Technology established

# Low NA SI-POF; Structure

$$NA = \sqrt{n_{\text{core}}^2 - n_{\text{clad}}^2} \quad \text{Bandwidth} \quad 2c n_{\text{core}} / [NA]^2$$



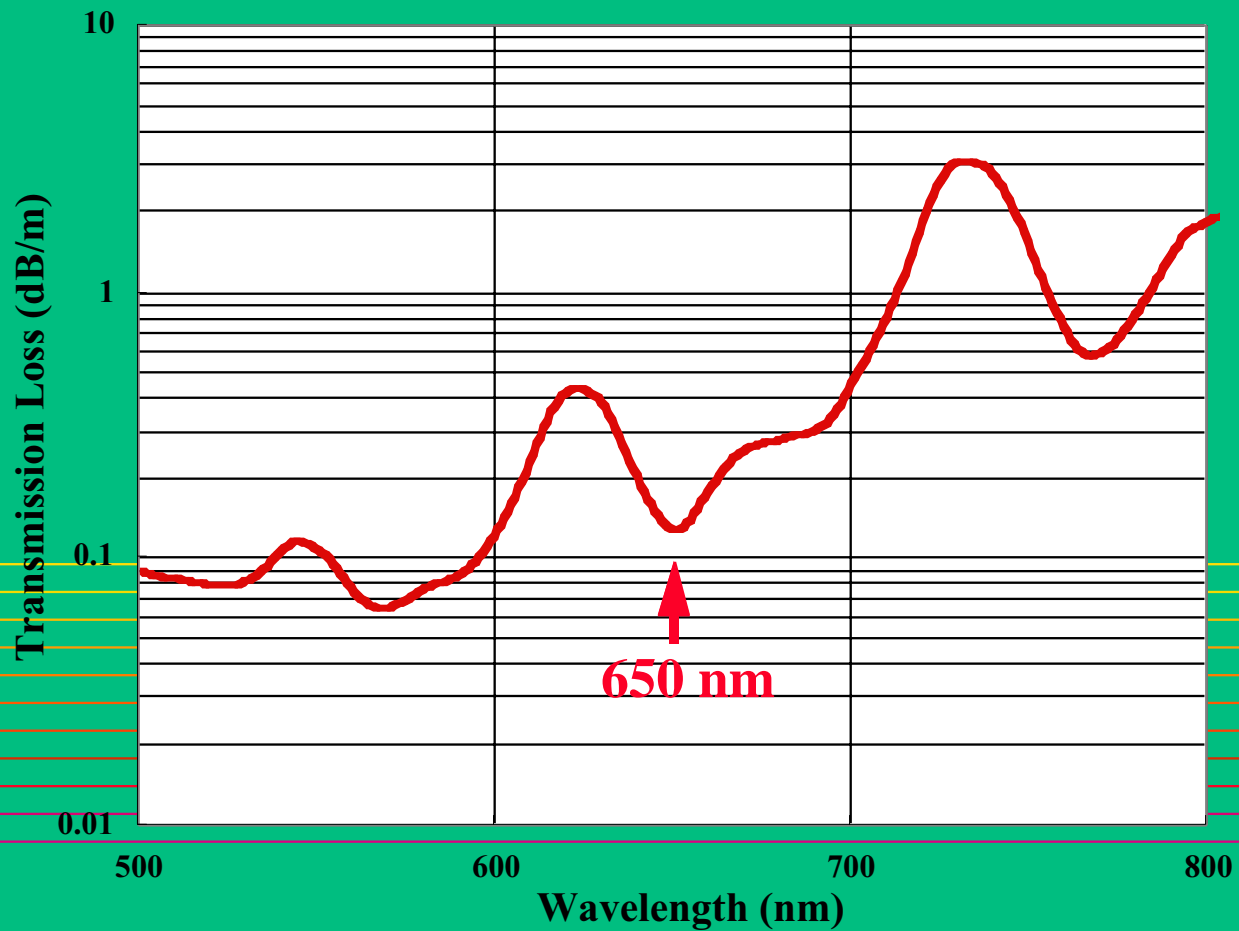
<Conventional POF>

NA=0.5

<Low NA SI-POF>

NA=0.3

# Low NA SI-POF; Loss spectrum



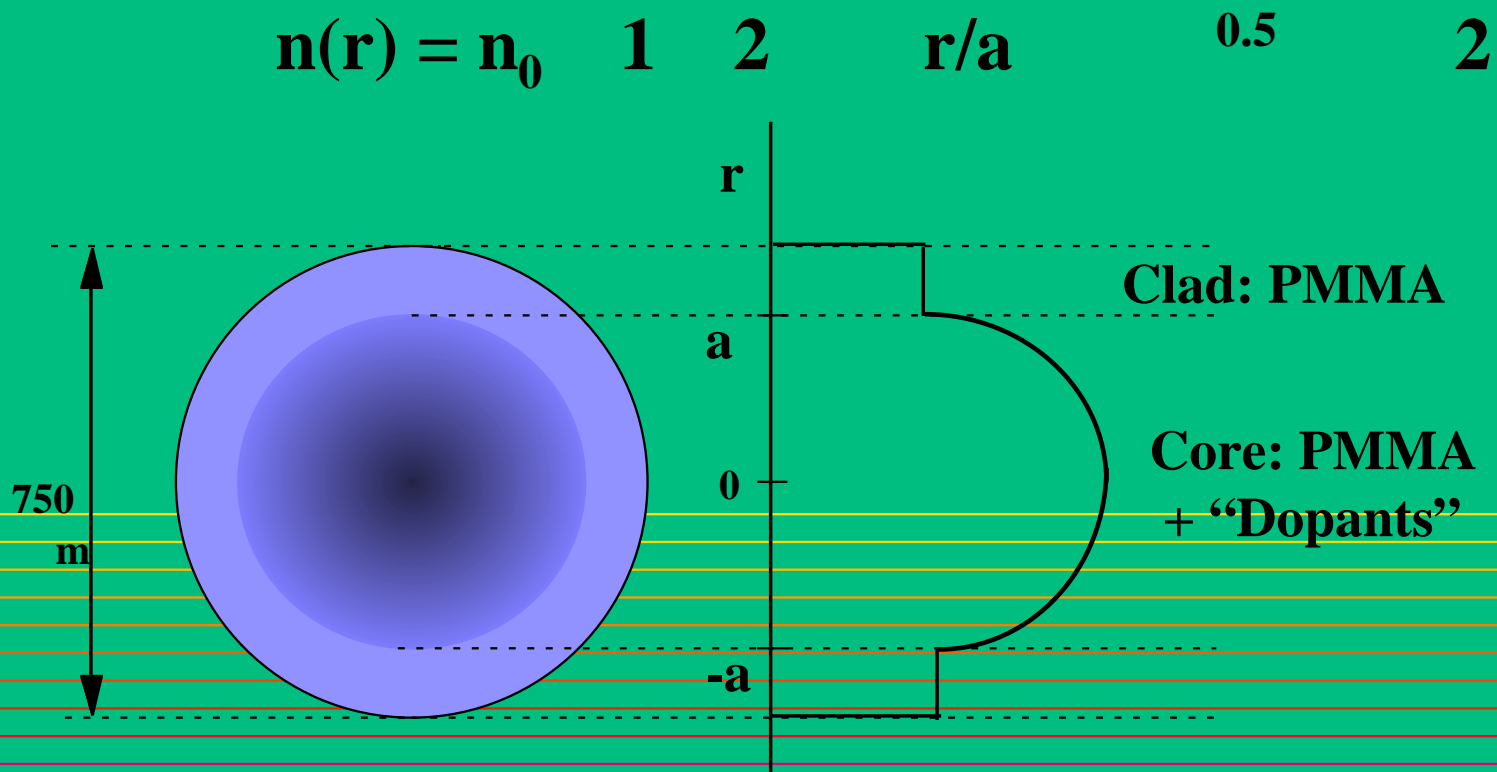
# Low NA SI-POF; Data sheet

<b>Product code</b>	<b>MH4002</b>
<b>Fiber diameter</b>	<b>1000 m</b>
<b>Jacket material</b>	<b>Polyethylene</b>
<b>Transmission loss</b>	<b>15dB/100m*</b>
<b>Bandwidth</b>	<b>&gt;160MHz@100m*</b>

\* With 650nm collimated light

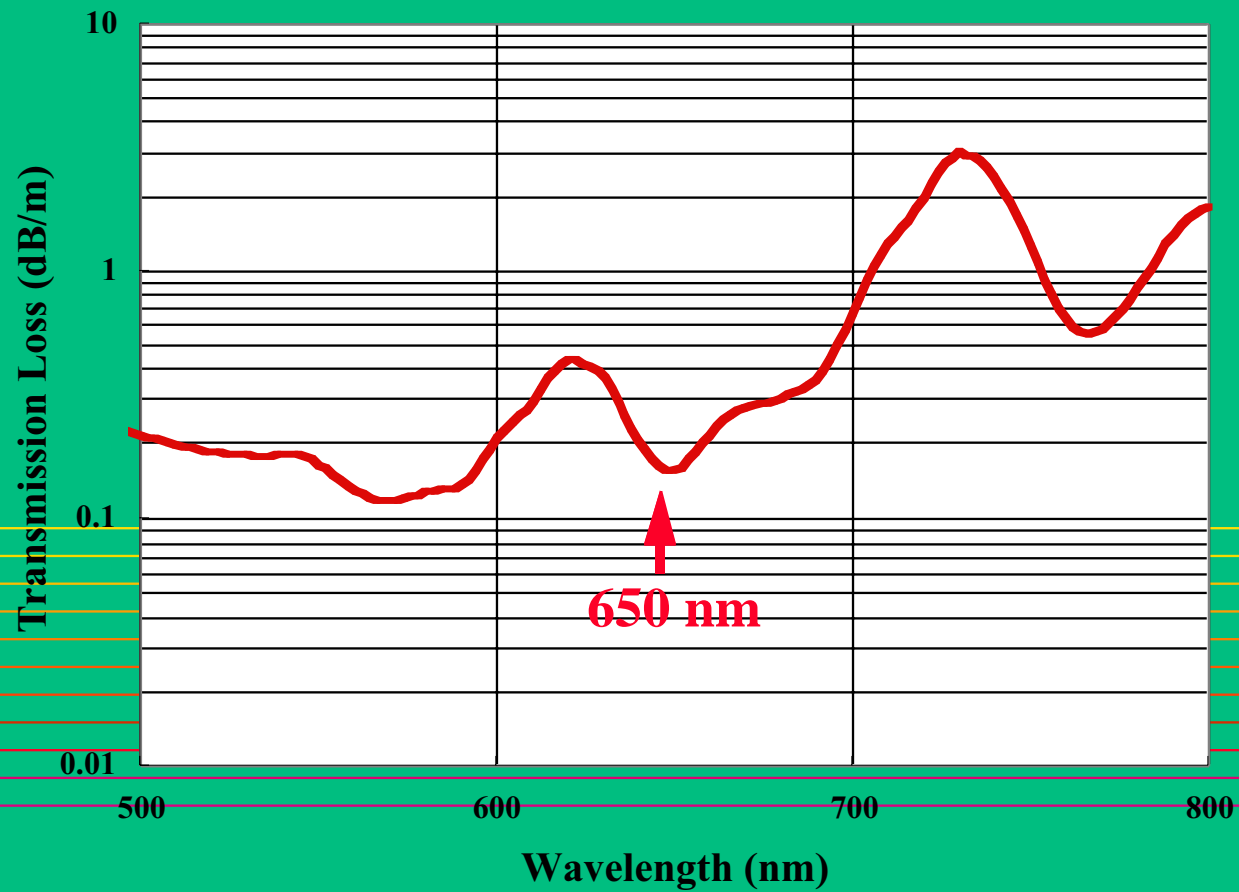
Typical value, not the product specification

# ESKAGIGA™



Refractive Index Profile

# ESKAGIGA<sup>TM</sup> - Loss spectrum



# ESKAGIGA<sup>TM</sup> - Data sheet

<b>Product Code</b>	<b>RH4001</b>
<b>Fiber diameter</b>	<b>750 m</b>
<b>Jacket material</b>	<b>Polyethylene</b>
<b>Transmission loss</b>	<b>16dB/100m*</b>
<b>Bandwidth</b>	<b>1GHz@100m*</b>

\* With 650nm collimated light

Typical value, not the product specification

# **ESKAGIGA<sup>TM</sup> ⇒ New fiber**

- ◆ **Issues of ESKAGIGA<sup>TM</sup>**
  - ◆ **Inefficient process; Costly!**
  - ◆ **Concerns on thermal stability**
- ◆ **New Fiber**
  - ◆ **Massproducible process**
  - ◆ **Thermal stability guaranteed**

# Current status of new fiber

- ◆ **Sample performance**
  - ◆ **Bandwidth; 400-800MHz@ 100m**
  - ◆ **Transmission loss @ 650nm < 20dB/100m**
- ◆ **Design flexibility for various speeds**

# Roadmap

- ◆ Target
  - ◆ SI-POF S200 challenge -1997/E
  - ◆ GI-POF S200-S400 -1997/E
  - ◆ GI-POF 1GHz -1998/E
- ◆ Collaboration with  
650nm transceiver vendor

**SI-POF**

**S100**

**S200**

**S400**

**GI-POF**

**S800**