

Handling Kiriama Microstructured Polymer Optical Fibres

Microstructure Polymer Optical Fibres (mPOFs) manufactured by Kiriama have unique characteristics that require alternative handling techniques compared to conventional optical fibres. These procedures are very quick and easy to learn, but should be followed to ensure the best performance from the fibre.

1. Terminating

Terminating Kiriama mPOF is a simple process. Fibres can be cut to length in seconds as no specialist training is required.

There are two methods that provide reliable cleaves:

- The first is the Cold Blade method which is ideal for rapid termination.
- The second is the Hot Plate method that provides high quality end-face surface finish for optimum coupling¹.

The Cold Blade mPOF termination process is outlined below.



Step 1: Clean the cutting surface (preferably polished smooth surface).



Step 4: Bring the razor blade close to the fibre in a perpendicular plane. Slowly press the blade down onto the

top surface of the fibre to initiate the crack. The crack will propagate to provide a smooth end-face surface.



Step 2: Inspect the razor blade to ensure there is no damage to the cutting edge.



Step 5: Inspect the fibre end-face. If there are splinters, repeat the process from Step 2. It is also recommended to

inspect the fibre end-face quality under a microscope.



Step 3: Firmly brace the fibre with your fingers onto the cutting surface.

The Hot Plate mPOF termination process is outlined below.



Step 1: Clean the cutting surface of the Hot Plate Cleaver.



Step 5: Hold the fibre with your fingers to provide some tension while aligning the fibre into the V-groove.



Step 2: Inspect the razor blade to ensure there is no damage to the cutting edge. Make sure the edge of the

razor blade is aligned with the base of the Hot Plate Cleaver when the cutting handle is in the down position.



Step 6: Lever the cutting handle down in one smooth motion until the blade cleaves the fibre.



Step 3: Place the Hot Plate Cleaver onto a heating surface. Heat the cleaving base of the Hot Plate

Cleaver and monitor the temperature until it is approximately 70°C (NB: The optimal temperature depends on the microstructure design and the fibre diameter).



Step 7: Lift the cutting handle away from the cleaving base and remove the fibre from the cleaving base.



Step 4: Firmly brace the fibre with sticky tape into the appropriate sized V-grooves on the cleaving base of the

Hot Plate Cleaver to one side of the razor blade axis.



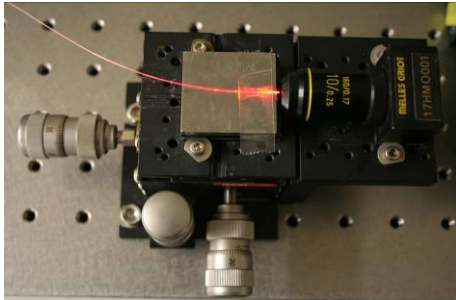
Step 8: Inspect the fibre end-face. If there are splinters, repeat the process from Step 2. It is also recommended

to inspect the fibre end-face quality under a microscope.

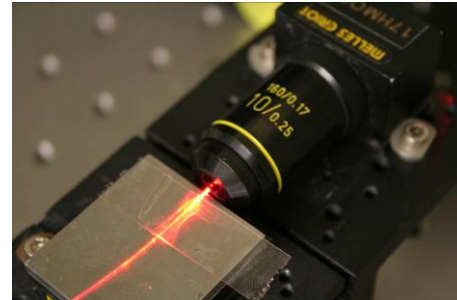
The fibres are now ready for coupling using free space optics or conventional mechanical POF connectors².

2. Free Space Optics Coupling

The most efficient way to couple Kirيامa mPOFs to an external device is through free space optics. Aligning the light using lens on an XYZ stage ensures the light is coupled directly into the core of the fibre. A lens magnification with numerical aperture corresponding to that of the fibre should be used for uniform mode distribution³.



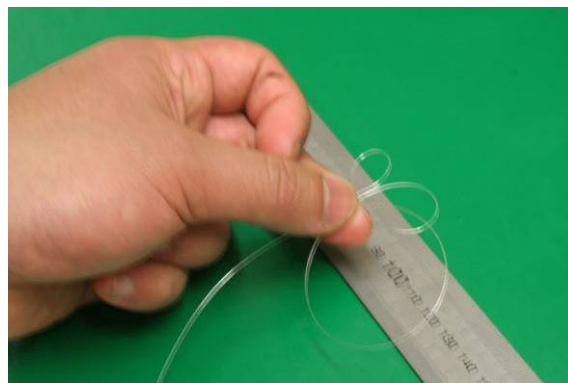
Light coupled into fibre on XYZ stage



Fibre endface a few millimetres from the lens

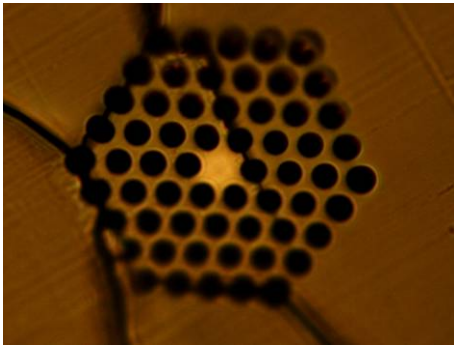
3. Bending

Kiriamա mPOFs are very flexible and can be bent to small diameters without significant bend loss⁴ or fibre breakage. However, like any other optical fibre, sharp kinks in the fibre will ultimately damage the fibre. To ensure optimum performance from the fibre, minimum bend radius of 5mm is recommended.

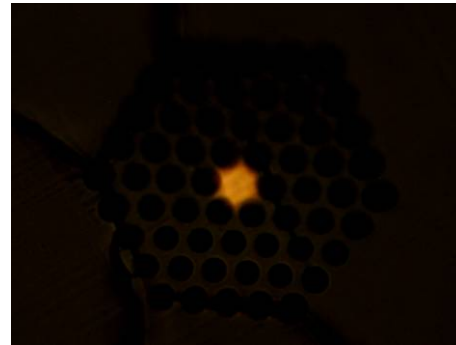


4. Stripping Cladding Modes

Kiriama mPOFs are bare fibre so there is no mechanical stripping of the cladding required. Cladding modes can be removed by either dipping the fibre (not at the end-face) in index matching oil, or by lightly roughing the surface of the fibre using fine grit sandpaper, or by running a black marker along the fibre. This will remove any light in the cladding.



Before stripping of cladding modes



After stripping

Reference

1. S. Law *et al.* 'Cleaving of microstructured polymer optical fibres', *Opt. Comms.* Vol 258, pp 193–202 (2006).
2. R. Lwin *et al.*, "Connecting Microstructured Polymer Optical Fibres to the World," 18th international conference on plastic optical fibers, Sydney, Australia, 7-11 September (2009).
3. W. Daum *et al.*, "POF Polymer Optical Fibers for Data Communication", Springer-Verlag, (2002).
4. A. Argyros *et al.*, "Bend loss in highly multimode fibres," *Opt. Lett.*, Vol. 16, No. 23, pp. 18590-18598 (2008).