Lensed single-mode fiber arrays

What are lensed fiber arrays?

Efficient coupling light from photonic integrated chips (PICs) e.g. based on SiN, Si or InP technology requires a single-mode fiber (SMF) with a mode-field diameters (MFD) matched to the PIC. However typical SMFs have MFDs of around 10 µm while most PICs require MFDs in the range of few micrometers or below. To achieve mode matching, lensed-fibers or tapered fibers are used. These are SMF with either a lens or a taper melted or etched to the SMF. By this method neither length nor pitch of several SMF can be precisely matched to form an array of lensed SMFs. To overcome this challenge, we use V-Groove arrays, that have a well-defined facet and pitch. We fabricate lenses onto this facet with 3D-microprinting based on two-photon polymerization. We are able to fabricate **aspheric freeform lenses** with highest reproducibility, also available as lensed SMF-arrays.

What performance can lensed fiber arrays deliver?

It has been demonstrated that individual lensed fibers can couple InP lasers with losses of down to 0.6 dB into SMFs [1]. Losses to SOI chips are highly dependent on the taper. For standard 200 nm taper we expect losses down to 1.5 dB.

What specification can I order?

Our lensed fiber arrays can be either purchased on a 127 µm pitch SMF-array or a 250 µm SMF-array. We can supply lensed fiber arrays with MFD from 2.3 µm to 10.4 µm for a wavelength of 1310 nm or 1550 nm.

Can I order custom optics on SMF-arrays?

Yes, we can provide larger MFDs up to 25 µm as well as larger working distances, different wavelength or custom optics/fiber arrays, multi-core fibers and custom fibers and optics.

What power can the lenses withstand?

We could couple with powers of up to 3 W (35 dBm) at a wavelength of 1550 nm. Please note that this is close to destruction threshold, typical operation should be below 30 dBm at 1550 nm.

Further information:

[1] Dietrich et al., Nature Photonics **12**, 2018, doi: 10.1038/s41566-018-0133-4

[2] S. Schneider et al. "Optical coherence tomography system mass-producible on a silicon photonic chip," Opt. Express **24**, 1573–1586 (2016).

How can I order the lensed SMF-arrays?

Please mail at sales@vanguard-photonics.com and specify the Article Number and the Order Number as described on the web page. Please ask for standard lensed fiber arrays or customized optics. Also, please indicate the 'Corpus' shape as referred to in Figure 1.

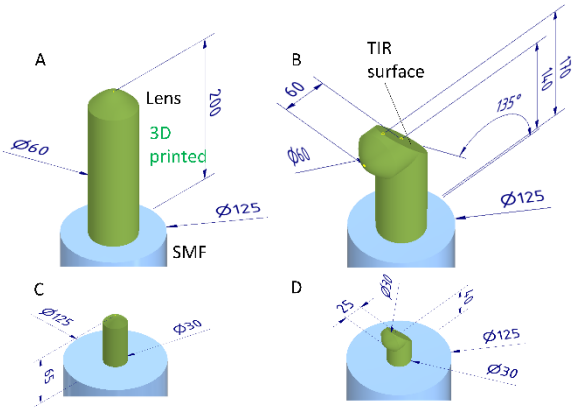

Figure 1 Available base models that can be fabricated either on 127 µm pitch or 250 µm pitch fiber arrays. Each base model can be equipped with different lens surfaces with different working distances and mode-field diameters.