

A typical optical fiber heterostructure is singlemode-multimode-singlemode (SMS) fibre structure which is a combination of two different types of optical fibre, where a short length of multimode fibre (MMF) is sandwiched between input and output singlemode fibres (SMFs). The light injected from the input SMF excites multiple modes propagating in the MMF. Interference occurs between these modes and as a result the nature of the light reaching the output SMF is dependent on a number of physical parameters, such as refractive index, core diameter and the length of the MMF section. This dependence gives SMS structures great potential for use as sensors or other components, like filters and couplers in optical communications systems. Compared to other functional optical fibre components, a SMS fibre structure has advantages in cost, simplicity and ease of fabrication. As sensors, their sensitivity is also competitive with other types of fibre sensor.

SMS fibre structures are a promising approach for developing a variety of optical fibre components and sensors. Investigations are not only in designing new types of SMS structures but also in the combination of SMS structures and other optical fibre components such as Fiber Bragg Gratings and Long Period Gratings as a way of implementing all-fibre based components, for example refractive index sensors and filters for coarse wavelength division multiplexing communications systems. Potentially SMS structures will have new application areas in bio- and chemical sensing.