

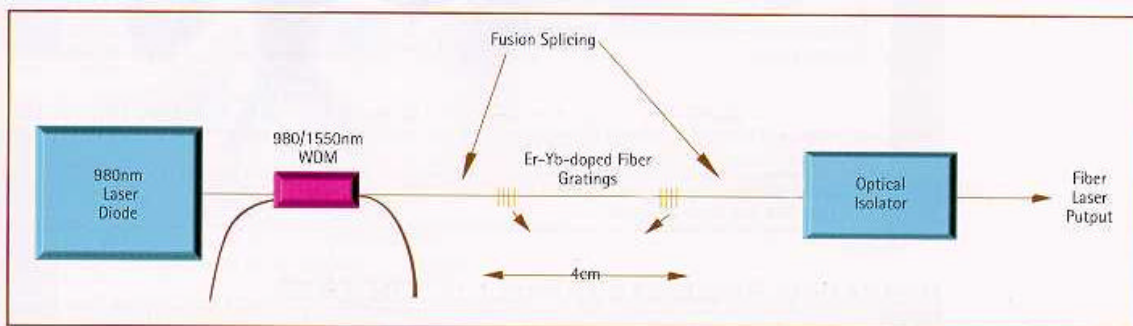


## Fibre Laser for Optical Communication Systems



Single-frequency fibre lasers, which utilise intra-core distributed Bragg reflectors (DBR) for cavity feed-back and mode selectivity, are attractive alternatives to semiconductor laser diodes in optical communication systems. Their engineering simplicity, fibre compatibility and convenient wavelength selectivity during manufacturing are just some of the advantages they possess over present laser diodes. In this project, fibre lasers using Er/Yb doped fibre as the active gain medium was constructed. In particular, the doped fibre adopted has a photosensitive ring around the Er/Yb core so that fibre Bragg gratings (FBG) can be written directly on it.

Results obtained based on the above configuration show a substantial pump induced thermal effect on the fibre Bragg gratings. By thermally conditioning the gratings, significant Relative Intensity Noise (RIN) improvements were achieved. Other results obtained also show a high dependency of the wavelength drift on the thermal stability of the FBG. Wave-length drift of less than 1.5GHz has been achieved over 90mA pump source variation, which remained stable for hours. Further experiments to demonstrate single frequency operation with a KHz range narrow linewidth have also been carried out successfully. Bit Error Rate (BER) tests conducted on the above fibre laser also yielded convincing results.



*Schematic of fibre laser system*

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