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How Premium GFFs Improve EDFA Performance And Optimize Module Design

Indium's premium GFFs deliver higher-level performance than traditional GFFs to meet stringent PPEF specifications, as well as provide additional functionality.



By Steven Zeng and Michelle Demaree, Iridian Spectral Technologies

Gain flattening filters (GFFs), used to smooth out (i.e., "flatten") unequal signal intensities over a specified wavelength range, have evolved significantly over the past 20 years. While the packaging and materials utilized to construct these components have remained almost unchanged, advances including improved coating processes and optimized manufacturing uniformly have pushed GFF performance to new heights.

More advanced, modern GFFs take advantage of designers' ability to exert greater control over peak-to-peak error function (PPEF) — calculated by comparing the spectral performance of the manufactured filter to a client's target gain curve specification — and can be packaged with higher level performance and imbued with additional functionality. For example, some applications require multiple flattening regions or the addition of a passband outside the flattening region.

The slightest advantage in GFF performance or functionality can have huge implications for designers of erbium-doped fiber amplifier (EDFA) modules. While variation of signal intensity is unavoidable, EDFA module designers must reduce that intensity difference to meet the specifications demanded by their own customers. If the filter they use (e.g., GFF) do not facilitate an error function (EF) space within the customer's range, the EDFA designer is challenged to tighten parameter tolerance control in their packaging to correct the signal intensity variation.

For example, if the module designers' EF budget for an EDFA is 1 dB, they must determine how that budget will be shared across components in the unit. If a GFF vendor can provide a filter or a series of filters with 0.5 dB EF, the EDFA module designer has 0.5 dB EF to work with throughout the rest of the system. But, if the GFF vendor provides a filter achieving 0.2 dB EF, the EDFA designer now has a 0.8 dB EF budget to work with across the rest of the system. It is with these margins in mind that Iridian Spectral Technologies has developed its latest generation of premium GFFs.



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Advances in Gain Flattening Filters

Gain flattening filters (GFFs), used to smooth out unequal optical signal intensities over a specified wavelength range in optical amplifiers, have evolved significantly over the past 20 years. While the packaging and materials utilized to construct these components have remained almost unchanged, advances including improved coating processes and optimized manufacturing control have pushed GFF performance to new heights.

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