News Release

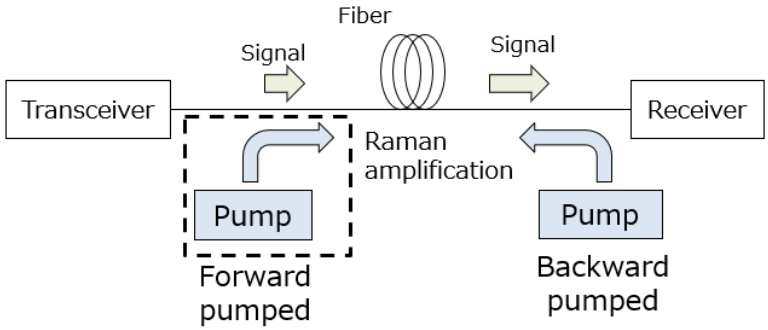
Furukawa Electric Announces the Development of the Forward Raman Unit

Incoherent light generated by optical semiconductors enables longer distance and higher signal transmission

OFC 2023, Booth 3229, San Diego, California, February 27, 2023 - Furukawa Electric Co., Ltd. (FEC) announces the Forward Raman Unit utilizing low noise incoherent light as the pump source. The wide bandwidth of the incoherent light suppresses the interaction between the pump light source and signal light resulting in low noise signal transmission and higher quality signal transmission.

Background

Raman amplification (*1) is a core technology in optical fiber communications. Backward Raman amplification, which amplifies optical signals from the receiving side, is applied in current optical fiber communications systems. The pump light propagates in the opposite direction to the signal light in backward Raman amplification. Although the impact of noise caused by the pump light is averaged and reduced, there is room to improve the transmission characteristics of the signal light propagating through the optical fiber. On the other hand, with forward Raman amplification, the pump light propagates in the same direction as the signal light. The ability to amplify the output power of the signal light from the transmission input point reduces signal light attenuation. Therefore, it is expected that the benefits of Raman amplification can be maximized. However, the impact of pump light noise needed to be addressed.



Details

The newly developed Forward Raman Unit uses low noise incoherent light as the pump source. Because our incoherent light has a wide bandwidth, it suppresses the interaction between the pump light source and signal light. As a result, it is possible to reduce the impact of noise in the Forward Raman Unit and bring higher-quality signal transmission (Fig. 1).

Forward Raman Unit

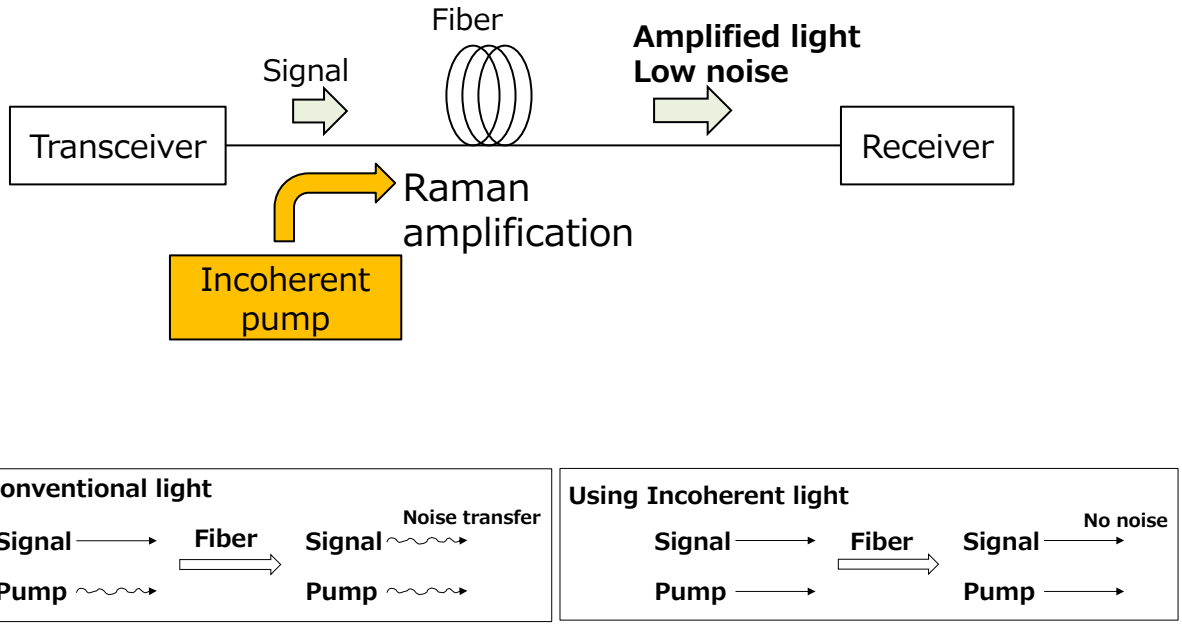


Fig. 1: Schematic diagram of forward Raman amplification

Also, compared to the conventional backward Raman amplification, signal light attenuation while

propagating through a fiber is decreased when adding forward Raman amplification. Therefore, it is possible to maintain a high signal quality during transmission (Fig. 2). As a result, the transmission distance is extended while also improving the quality of the signal over the same distance. This new Forward Raman Unit will contribute to solving the issue of reduced transmission distance resulting from faster transmission speeds in recent years.

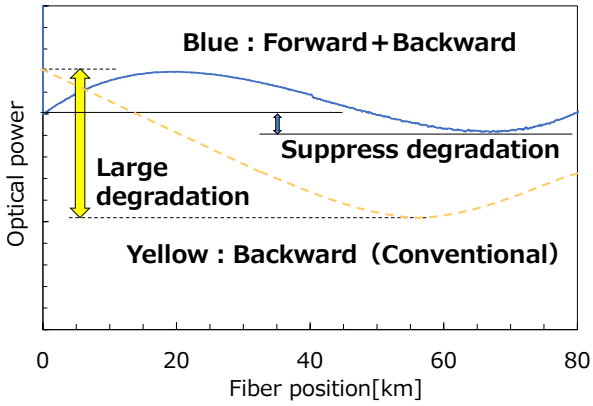


Fig. 2: Schematic diagram of signal quality

In addition to these developments, Furukawa is working to increase the output power of the Forward Raman Unit by amplifying the incoherent light using our unique Second Raman method (*2) technology. We will further improve the amplification characteristics by increasing the output power of the optical semiconductor incoherent light sources.

The new Forward Raman Unit will be exhibited at OFC, March 7-9, 2023, in San Diego at OFS booth 3229, and samples to be available in July 2023.

Definition of Terms

(*1) Raman amplification: When pump light is input into an optical fiber, stimulated Raman scattering occurs in the wavelength region that is 100nm longer than the wavelength of the pump light. If signal light propagates with the pump light, it is amplified through stimulated Raman scattering. As a result, this effect can be used as an optical amplification. Such amplification has excellent characteristics, including wide amplification bandwidth and amplification at any bandwidth, and it is widely used today.

(*2) Secondary Raman pumping method: Method that uses a coherent light source to amplify the incoherent light source while propagating through an optical fiber. As a result of Raman amplification, the coherent light source amplifies the incoherent light source in the transmission fiber, making it possible to

provide secondary Raman amplification to the signal light while maintaining low noise.

Furukawa Electric Group's efforts toward the SDGs

Based on the "Sustainable Development Goals (SDGs)" adopted by the United Nations, Furukawa Electric Group has formulated the "Furukawa Electric Group Vision 2030" which sets forth the year 2030 as its target and is advancing efforts with the aim to "Build a sustainable world and make people's life safe, peaceful and rewarding, Furukawa Electric Group will create solutions for the new generation of global infrastructure combining information, energy, and mobility." Toward achieving our Vision 2030, we will take open, agile, and innovative approaches to promote ESG management that aims to increase corporate value over the medium to long term and will contribute to achieving the SDGs.

Furukawa Electric Group's efforts towards the SDGs
https://furukawaelectric.disclosure.site/ja/themes/182

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