New Technique for Optical Switching

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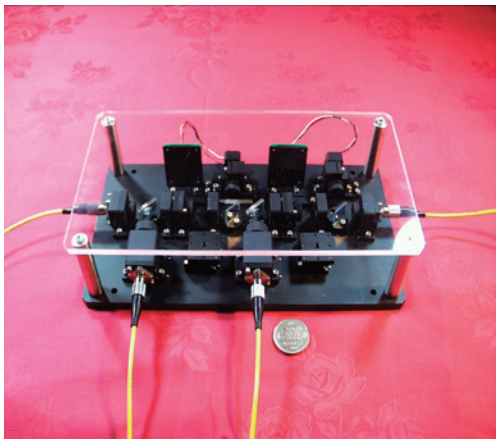
The Photonics Research Institute has been successful, in collaboration with Dainichiseika Color & Chemicals Mfg. Co., Ltd., in developing a device ("optical switch") capable of separating the incident signal light from the optical fibers directly, without conversion to the corresponding electrical signals, under optical control and of outputting these optical signals to other multiple optical fibers. The separation of the signal light under optical control is achievable by utilizing the high-speed thermal lens effect generated in a thin-film element by applying the control light to a stacked layer-type organic thin-film optical element. This system is capable of separating the incident light at micro-second speed. Since, furthermore, light is also used for switching control, this development marks a technical breakthrough toward the realization of an "exclusively photonic optical switch," a technology recognized as essential for the next generation photonic network.



Developed All-optical photo-switch

Development of High Power and Low Loss SiC MOSFETs

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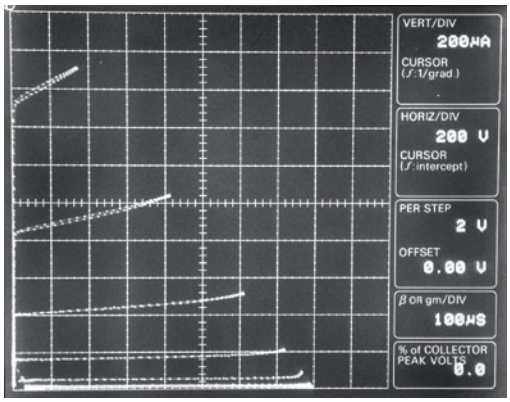
SiC(Silicon Carbide) MOSFET has been investigated for ultra-low-loss high power electric device applications. However, the channel mobility (μ_{ch}) of SiC MOSFETs is extremely low, and its improvement has been a critical issue in this field. We have developed a pyrogenic re-oxidation annealing (ROA) for improving the low μ_{ch}, where the amount of water content (ρ_{H2O}) is controlled by adjusting the oxygen/hydrogen gas flow rate. Significant μ_{ch} improvement is attained when the ρ_{H2O} is over ~25%. Using this pyrogenic ROA in conventional SiC vertical MOSFET fabrication process, we succeed in reduction of specific on-resistance to tenth of Si MOSFET theoretical limit.



Typical output characteristics of (0001) 4H-SiC vertical MOSFET