

Non-volatile optical phase shifters on Si photonics platform

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A programmable Si photonic integrated circuit (PIC) [1] is emerging for various applications, including communication [2], computing [3, 4], and sensing [5]. To adjust its functionality, the optical phases of signals need to be controlled through multiple optical phase shifters integrated into the PIC. However, thermo-optic (TO) phase shifters, which are commonly used in silicon PICs, have high power consumption [6]. Moreover, their volatility leads to complex electrical wiring, especially when the number of phase shifters is large. As an alternative to TO phase shifters, we have investigated non-volatile optical phase shifters based on a III-V/Si MOS capacitor [7, 8], phase change materials [9], and ferroelectric HfZrO₂ [10]. In this paper, we present our recent results of these non-volatile optical phase shifters in Fig. 1.

Acknowledgement:

This work was partly supported by JST-Mirai Program (JPMJMI20A1), JST, CREST (JPMJCR2004), JSPS KAKENHI (JP23H00172), and “Advanced Research Infrastructure for Materials and Nanotechnology in Japan” of MEXT Grant Number JPMXP1224UT1028, and partly based on results from project (JPNP16007) commissioned by NEDO.

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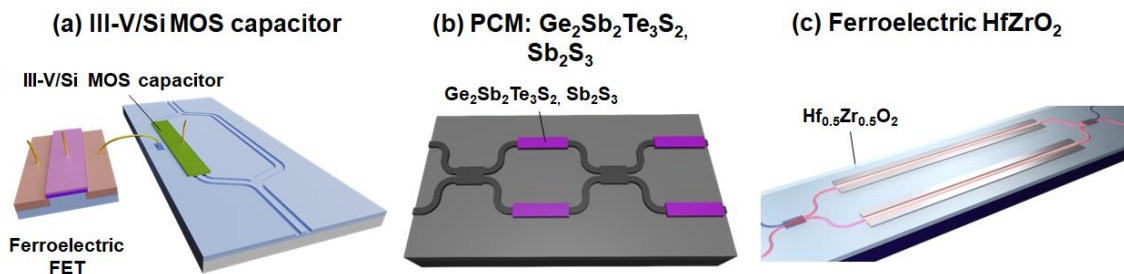


Figure 1 Non-volatile optical phase shifters based on (a) III-V/Si hybrid MOS capacitor, (b) phase change materials, and (c) ferroelectric HfZrO₂.