In recent years, our demand for data processing has been increasing. As a result, the amount of data generated by applications related to data services, such as cloud services and autonomous driving technologies, is expected to multiply in the next few years. The current data transmission in integrated circuits mainly relies on metal wires; however, as the size of semiconductor devices shrinks, the resistance and capacitance delays and energy losses caused by metal wires limit the data transmission speed. Therefore, the use of integrated optical circuits instead of integrated circuits has been considered as a possible solution to reduce energy consumption effectively. Besides, there will be no interaction between photons, and photons of different frequencies can be transmitted in the same channel so that the data transmission speed will be several orders of magnitude faster than that of electronic circuits. Hence, the goal of our laboratory is to develop novel nanolasers that can be electrically driven at room temperature to break through the limitations of fundamental physics.