リアル空間を強靭にするハードウェアの未来　　2022 年度
2022 年度採択研究代表者　　年次報告書

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Compact and low cost ultra-wide band photonics-based 3D imaging system at millimeter/terahertz band

研究成果の概要

As was summarized in the research plan, two objectives will be mainly focused on during the fiscal year of 2022: the setup of the laser source and the simulation design of the integrated module for the 300 GHz band imaging.

All the components were prepared for the laser system, and the laser source was set up to obtain the preliminary results. Currently, an 11.6 μs chirp signal with 20 GHz bandwidth was received by circulating the laser pulse 100 times, with a frequency step of 200 MHz. The concise optic path caused leakage during each circulation, limiting the chirp signal's bandwidth. Hence, further optimization of the laser source is required to reach the>100 GHz bandwidth goal.

For the integrated silicon photonics module, the preliminary designs were fabricated with the financial support of Prof. Fujita. The simulation and experimental results were compared, and the fabricated modules were validated with the existing THz sources. However, two of the three designs are not agreed with the simulation well. The isolation and the bandwidth were not sufficient to reach the final goals. The improvements of both design and fabrication were undergoing; the second round of modules will be presented soon.

In conclusion, the objectives are achieved according to the plan. However, both are not perfectly achieved, and further improvements are necessary for academic publications. It is expected that a paper on 40-GHz band millimeter wave photonic radar and an article on 300-GHz band silicon photonics module can be published during 2023 by improving these two objectives.