

Faculty of Engineering

Summer Research Program 2022-2023

Project Title: Flexible lasers

Supervisor(s): Associate Professor Sudha Mokkalapati, Professor Malin Premaratne

Department: ECSE

Email: Sudha.Mokkalapati@Monash.edu

Website profile of project supervisor:

<https://www.monash.edu/engineering/sudhamokkalapati>

Objective

The students will fabricate/grow three-dimensional nanostructured semiconductors: composites of gain material and scattering material. You will use state of the art nanofabrication equipment accessible at the Melbourne Centre for Nanofabrication (access provided through the supervisors account).

Project Details

Monolayers of transition metal dichalcogenides (TMDs) are direct bandgap semiconductors with material gain comparable to III-V semiconductors, traditionally used in lasers. TMDs have pristine surfaces or defect free surfaces, which makes them ideal for nano-structuring without compromising their quality. Nanostructured semiconductors are flexible, unlike conventional semiconductors, and can be used for flexible lasers or laser paints.

You will investigate three different approaches to fabricate nanostructured semiconductors. This project involves using state-of-the-art nanofabrication equipment, available at the Melbourne Centre for Nanofabrication (MCN). Semiconductors fabricated using the three approaches will be characterized and tested for lasing. Flexibility tests on the lasers will complete the project.

Prerequisites

Knowledge of basic semiconductor physics, aptitude to handle state-of-the-art nanofabrication equipment