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Name of the Department: **Department of Applied Sciences and Humanities**

Topic of Research: **Studies on Inorganic and Organic Semiconducting
Nanostructures**

The research work undertaken in my thesis involves the **Studies on Inorganic and Organic Semiconducting Nanostructures**. The research presented in this thesis focuses on the synthesis and characterization of organic and inorganic semiconducting nanostructures for optoelectronic device applications. I have synthesized nanostructures of a popular organic semiconductor Alq₃ doped with different metals and studied their properties. Cd-doped Alq₃ nanostructures, including Cd and Mg, were synthesized using thermal vapor transport method and showed enhanced luminescent properties, making them suitable for OLED applications. I have also synthesised inorganic perovskite and metal oxide nanostructures and studied their properties. Zn²⁺-doped CsPbBrI₂ perovskite nanocrystals were synthesized using a probe sonication method and exhibited excellent photophysical properties, indicating their potential for use in photovoltaic and LED devices. Metal oxide nanoparticles incorporated into hybrid perovskite (CH₃NH₃PbI₃) films such, such as ZnO, led to improved photovoltaic efficiency and stability. Overall, these as-synthesised organic and inorganic functional semiconductors nanostructures demonstrated enhanced functional properties, showing promise for various optoelectronic and photovoltaic applications.