Fiber Medical Devices For Diagnosis Of Coronary Artery Disease

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Coronary artery disease (CAD) is the leading cause of death in Singapore and worldwide. Our ability to understand, diagnose, and management of CAD has been hindered by lack of an imaging tool to obtain microscopic pathological information in living human. This Collaborative Research Program leverages on the newly established state-of-the-art fiber drawing facility and expertise in Centre for Optical Fibre Technology (COFT) of The Photonics Institute (TPI), and the photonics research excellence in OPTIMUS center, TPI, and aims to develop and validate clinically viable, next generation, fiber-optic technologies capable of obtain subcellular resolution images of coronary arteries. A multidisciplinary team with complementary expertise is dedicated to this effort: the lead PI Asst Prof Liu Linbo (EEE) and co-PI Prof Shum Ping (EEE) will develop core fiber-optics technologies; Nanyang Professor Ferenczi (LKCSoM) will develop animal disease models and Prof Philip Wong (NHCS) will validate the technologies in large animals; International collaborator Prof Tearney (Harvard Medical School and Massachusetts General Hospital) will develop diagnostic criteria and clinical viable devices. With the unprecedented resolution, cardiologists will be able to visualize, for the first time, sub-micron details of coronary atherosclerosis in vivo, which was only available after a patient is dead. The development of the next generation optical diagnostic technologies may dramatically change the clinical practice and improve patient care. It will be the first time that the high-resolution histological information is acquired from human subjects, which will help to increase the diagnostic accuracy, reduce the burden of patients and the load of clinicians. The results of this program will also be a platform to develop imaging technologies for cancer detection, and biomedical applications, such as pulmonary airway diseases, eye diseases and skin diseases, where visualization of sub-cellular morphology inside human body is critical.