Title of PhD project	**Development and implementation of highly sensitive SARS-CoV-2-specific immunodiagnostics for rapid and high throughput screening**	
Supervisor	Professor Sanjeev Krishna	SGUL
Co-Supervisor	Dr Qinxue Hu	SGUL
Brief description of project	As the coronavirus season largely overlaps with the annual flu season, a highly COVID-19-specific, rapid and high capacity immunodiagnostics will be a powerful tool to identify the presence of SARS-CoV-2 from other viral infections that cause similar clinical symptoms. Currently, neither SARS-CoV-2 nucleic acid test nor COVID-19 IgM/IgG test meets the above requirements. In this study, we use our patented Unitope technology to design immunogen, and generate single-domain antibodies (SdAbs) that specifically recognises the antigens of the virus responsible for COVID-19 in our well-established SdAb induction platform. Compared to normal antibodies, such SdAbs are smaller in size, able to bind to a larger number of accessible epitopes, have relatively low production costs and have improved robustness. These novel antibodies will then be used to develop diagnostic tests that will give rapid and reliable results, and that can be used to screen large numbers of clinical samples. This project offers the opportunity to acquire a wide breadth of skills and training in molecular virology, immunology, protein chemistry and bioinformatics analyses and is expected to support the development of innovative programmatic approaches to emerging virus outbreaks, elimination campaigns and epidemiological surveillance.	
Skills we expect a student to develop/acquire whilst pursuing this project	The student will be trained and develop skills in immunology and virology, including working with BSL-2/3 viruses; quantitative, statistical and bioinformatics analyses whilst analysing large datasets; interfacing with clinical experimental medicine, including ethics; critical thinking in disease control methods.	
Particular prior educational requirements for a student undertaking this project	Completion of an MSc module in infectious diseases and/or immunology is desirable. Experience in molecular biology would be an advantage.	

Project key words	COVID-19 SARS-CoV-2 Unitope design Single domain antibody Point-of-care immune diagnostics
Possible under 1+4 route? Master's options identified.	No
MRC Core Skills developed through this project	Interdisciplinary skills
MRC LID themes	Translational and Implementation Research Infectious Disease
Further reading	IgG Seroconversion and Pathophysiology in Severe Acute Respiratory Syndrome Coronavirus 2 Infection A potent bispecific nanobody protects hACE2 mice against SARS-CoV-2 infection via intranasal administration