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| **Research Theme: Computational Biology; Functional Genomics** |
| **PhD Research Project Title: Development of a nanotechnology modular platform for vaccination.** |
| **Scholarship category (Please indicate the source of funding for this project):**  **SBS Research Student Scholarship (for SBS faculty only)** |
| **Principal Investigator/Supervisor: Julien LESCAR** |
| **Co-supervisor/ Collaborator(s) (if any):** |
| **Project Description**  **a) Background:**  Vaccination remains key to combat infectious diseases. In the context of covid and future flu pandemics, a timely response requires the development of “plug and play” vaccination platforms that can be readily used to protect the population. In parallel to RNA vaccines that can be rapidly deployed, we propose to validate an alternative, modular, nanoparticle-based vaccination platform, that will help to respond to future viral outbreaks and pandemics. This vaccine platform entails the multivalent presentation of antigens at the surface of a protein-based scaffold to elicit a protective immune response. The presentation of a repetitive array of antigens at a surface of a protein scaffold enables efficient binding and activation of multiple B-cell receptors and hence a much more sustained immune response compared to immunization with isolated protein antigen subunits.  **b) Proposed work:**  Candidate coronavirus and influenza vaccines will be designed via the presentation of Spike or haemagglutinin antigens to a large scaffold (ferritin or lumazine synthase). This will be carried out using three parallel approaches: (i) through genetic fusion (ii) using proprietary ultrafast peptide asparaginyl ligases of Singzyme Pte Ltd, a Singapore company for which the PI is cofounder (iii) using the Spytag/Spycatcher system. Accordingly, yield, homogeneity, and scalability of NPs will be compared.  **c) Preferred skills: molecular biology/biochemistry/biophysics work are a big plus, but not indispensable.** |
| **Supervisor contact:**  **If you have questions regarding this project, please email the Principal Investigator:julien@ntu.edu.sg** |
| **SBS contact and how to apply:**  Associate Chair-Biological Sciences (Graduate Studies) : [AC-SBS-GS@ntu.edu.sg](mailto:AC-SBS-GS@ntu.edu.sg)  Please apply at the following:  **Application portal:** <https://venus.wis.ntu.edu.sg/GOAL/OnlineApplicationModule/frmOnlineApplication.ASPX> |