



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

Technologies and Expertise available at IITB w.r.t COVID-19

Areas of expertise

Diagnostics kits and related approaches

a. Prof. Ruchi Anand:

- Our lab can help with diagnostic as well as drug development 3D structure and drug pocket evolution as well as assay development.

b. Prof. Amit Agarwal

- Four microdevices have been developed which can potentially be integrated with an appropriate point-of-care or diagnostic device. These are:

- Blood plasma separation microdevice
- 3d-Hydrodynamic Focusing
- Constant temperature microdevice
- Platelet-rich-plasma separation microdevice

There is great value in selectively isolating and enriching platelets in plasma from whole blood with application in biomedical research and transfusion purposes.

c. Prof Rahul Purwar:

- Handles many types of virus including HIV (of course mutated ones).
- The main research interest in quantifying the immune response in population to understand the responders and non-responders.
- This expertise can help industry, academia and government in multiple ways. For example:
 - i) The team will be identifying the people, who have developed immunity after infection or vaccine candidates,
 - ii) The team can help diagnostic companies and can them developing ELiSa assays for antibody/ antigen quantification.

d. Prof Soumyo Mukherji:

- Has worked on technology to differentiate virus and bacteria. Rapid confirmative categorization of infections in clinical settings as bacterial or viral is frequently challenging due to the vague presentations of diseases and symptomatic similarities.
- Many earlier studies have shown the bactericidal effect of silver nanoparticles which, in the current study has been enhanced by synergistic action of polycationic chitosan stabilizers.
- An impedimetric electro-active polymer (polyaniline) modified paper substrate has been developed for generic differentiation of bacteria and virus based on their interaction with chitosan stabilized silver nanoparticles.
- These characteristic electrical impedance signatures of bacteria and virus, established here, have promising prospects in inexpensive and scalable bedside diagnostic development.

e. Prof Ambarish Kunwar:

- Coronavirus has become major global threat as it is rapidly spreading across the world originating from China. There is no treatment exists which effectively control the viral spread.
- Considering the severity of the novel coronavirus there is an urgent need to identify potent analogue / inhibitors which targets and controls the viral replication. Coronavirus proteases are considered as attractive targets for the design of antiviral drugs.
- The high-resolution crystal structure of main protease with its inhibitor has been very recently determined using x-ray crystallography. Therefore, we used this structure (PDB ID: 6LU7.pdb) to investigate atomic level interactions between main protease of corona virus and existing protease inhibitors using molecular modeling approach.

f. Prof. Sarika Mehra

- Development of an alternate assay for detection of virus; Alternate way of PCR based assay for the detection of virus

g. Prof. Mahesh Tirumkudulu

- Currently an ongoing projects to build blood cell counters, a diagnostic tool. These measure the complete blood count (CBC) - RBC, WBC and platelets. The number of WBC increases with a bacterial infection and hence is used to differentiate a bacterial infection from a viral infection. Further, the device can also detect virus infected cells, if one can synthesise fluorescent antibodies that will bind to virus infected cells. The latter is of course a challenge for COVID-19 and is a project in itself. Note that such blood cell counters are available in India but all of them are imported. The IMPRINT, GoI project was to develop indigenous technology.

h. Prof. Pradeep Kumar P.I.

- Diagnostic tools for the detection of Virus:
- Developing nucleic aptamers against viral antigens/proteins

i. Prof. Dipti Gupta

- Developing diagnostic devices by using the known biochemistry
- Wearable devices for monitoring health of COVID-19 patients

