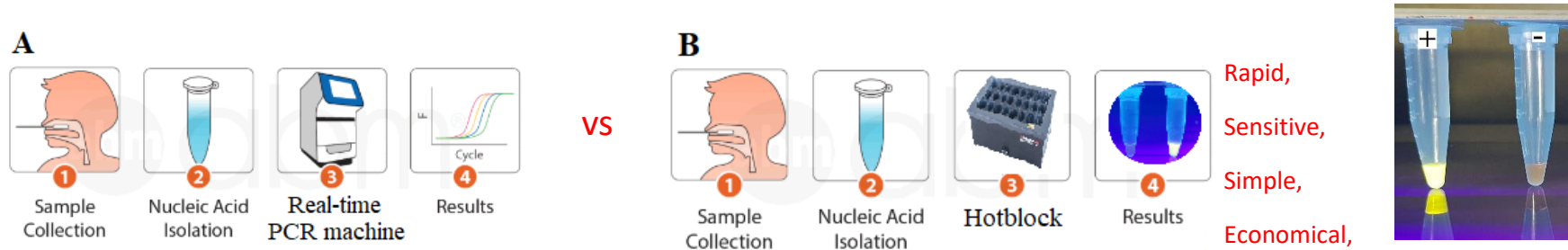


## MANAGING AND FIGHTING AGAINST THE COVID-19 PANDEMIC IN ISLAMIC REPUBLIC OF IRAN WITH THE USE OF EMERGING TECHNOLOGIES

One of the keys to breaking the chain of COVID-19 transmission in Islamic Republic of Iran is to conduct diagnostic tests by using emerging technologies for the design and fabrication of field-applicable diagnostic kits as indicated below:



With the pandemic prevalence of severe acute respiratory syndrome coronavirus 2 and the importance of cutting its transmission chains, the importance of using quick, simple, and cost-effective methods to achieve this goal is a priority for the management and control of the disease. Since the serological method only provides data on exposure to effects against the virus not the virus itself, two molecular methods including real-time PCR and LAMP have been reported and commercialized for virus identification.

Real-time PCR and its kits are widely used in diagnostic laboratories. The high cost of the kits, expensive equipment and the heavy cost of maintenance and the need for professional staff to work have imposed limitations on its wider application. Therefore, there is a need to use another supportive method to deal with probable serious scenarios of virus spread. The LAMP method which has been developed in the early third millennium BC, is based on the use of six to eight gene-specific primers without requiring a complex and expensive device. Within a shorter period of time and with a high specificity and sensitivity, this method provides results with higher readability. In this project, the target gene area and the selected primers are selected according to the latest studies based on the recent reports on the final bioinformatics check. Due to biosafety issues, the strategy of using an artificial synthesis of the target gene is employed and the gene construct is designed for target gene amplification and transcription in order to set-up and optimize the RT-LAMP for coronavirus identification. Finally, the LAMP method is optimized and presented as a sample kit model.

We plan to build a resilient society and facilitate sustainable economic recovery after COVID-19 pandemic with the use of emerging technologies.

Some positive effects of breaking the transmission chains toward sustainable economic recovery are:



We propose to establish the regional reference R&D centers for diagnosis and prognosis of COVID-19 with international or regional technology cooperation to address challenges of the COVID-19 crisis by adopting the following steps: joint research, rapid test system construction, materials preparation, instruments development, test validation, product forming, data analysis and exchange.

The regional reference R&D centers include:

- (1) *Raw materials and reagents preparation*: mainly enzymes, synthesis of fluorescent nanomaterials, etc.
- (2) *Instruments preparation*: mainly hot block, high throughput assay readouts, etc.
- (3) *Test strip reaction system construction*: it mainly includes the membrane main body, fluorescent nanomaterial placement pads, sample pads, the control areas, the fixation of biomaterials in the detection area, etc.
- (4) *Test validation*: mainly including various test conditions, standard samples, the detection limit, detection of simulated samples and real samples, calculation of the probabilities of false positives and false negatives, etc.
- (5) *Product forming*: optimization of products, matching reagents and materials, etc.