



NITM

Chronicle



Dr. Ramesh Pokhriyal
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Science is our only weapon against the #coronavirus pandemic! Kudos to Dr. Rakesh Roy, Assistant Professor of NIT Meghalaya for innovating simple, re-usable and low-cost hand gloves to minimize the spread of corona virus. #COVID19



The Shillong Times

April 03, 2020

NIT faculty develops low-cost gloves to contain virus



By Our Reporter

SHILLONG: An assistant professor of NIT, Meghalaya, Rakesh Roy has developed a special type, simple and low-cost hand gloves to minimize the spread of spreading of corona virus.

Speaking to *The Shillong Times*, Roy said it can

be used by the people of any economy.

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Roy can be reached at royakeshnit@gmail.com.

CORONAVIRUS

COVID-19 is a contagious respiratory and vascular disease caused by infection with the severe acute respiratory syndrome coronavirus 2(SARS-CoV-2)virus strain. The ancestor of SARS-CoV-2 could have been circulating in bat populations for a considerable amount of time. Mutations have been acquired by it to spill over from bats into other animals, including humans. It emerged from Wuhan, Hubei, China.

It mainly **spreads through** the air when people are near each other long enough, primarily via small droplets or aerosols, as an infected person breathes, coughs, sneezes, or speaks heavily. The **symptoms** range from mild illness to pneumonia. It affects the upper respiratory tract (sinuses, nose, and throat) and the lower respiratory tract (windpipe and lungs). Real-time reverse transcription-polymerase chain reaction (rRT-PCR) is the standard method of testing. **Preventive measures** to reduce the chances of infection include staying at home, wearing a mask in public, avoiding crowded places, keeping a distance from others, ventilating indoor spaces, washing hands with soap and water, practicing good respiratory hygiene, and avoiding touching the eyes, nose, or mouth with unwashed hands. **Aarogya Setu App**, India's primary contact tracing technology, was launched on April 2, 2020. The National Informatics Centre developed the app under the Ministry of Electronics & Information Technology. The app is designed to keep track of other app users that a person came in contact with. It then alerts app users if any of the contacts tests positive for COVID-19.

Worldwide several existing medication trials, including medications Remdesivir, Chloroquine, Hydroxychloroquine, etc are being evaluated for the treatment of COVID-19. Out of which, in April 2020, at least 29 phase II-IV efficacy trials in COVID-19 were scheduled to provide results from hospitals in China. Across several countries, repurposed antiviral drugs with nine Phase III trials on Remdesivir were done by the end of April. The effectiveness of hydroxychloroquine as a treatment for the virus, with some studies showing little or no improvement, gave mixed results as of April 03, 2020.



- **Obeidullah Khan**

Associate Editor, NITM Chronicle



with Dean Student Welfare, NIT Meghalaya

TEAM: Sir, in this new semester, newly admitted students are from different mediums. As the institute of national importance, how can we maximize their learning at NIT Meghalaya?

DEAN (SW): We are well aware that the student across the corner of our country does take admission in our institute for their higher studies. Not even that, under “STUDY INDIA SCHEME,” we have few more students from abroad from different countries with different cultures and languages. Since all the students, whether national or international, come from different senior secondary backgrounds. So,



*Dr. Atanu Banerjee,
Dean (SW), NITM*

being aware of their limitations we conduct three weeks or twenty-one days induction event for the B. Tech 1st year students to make them familiar with the institute environment, infrastructure, and the other facilities. We have different modules like “UNIVERSAL HUMAN VALUES,” “LECTURE BY EMINENT PEOPLE,” various co-curriculum activities etc., through which we try to get them familiar with the new environment and yet, we have kept few passive learning modules including, Mathematics, Computer and English. We found 50%- 60% of students in the NIT system who have come from their respective state board a little weak from language point of view. We seriously address in our induction module and let them study and undergo a professional course in English.

TEAM: Sir, due to this lockdown, the classes have stopped abruptly; how will we ensure that students will continue their classes? Apart from the mainstream studies, they also participated in the co-curricular activities; how will we ensure that they stay physically and mentally fit during this pandemic?

DEAN (SW): Since we are going through a pandemic period, the Government of India and the respective state governments have declared nationwide lock-down, since the middle of March. So, from that time, no physical classes were possible to conduct in the institution, and all the students

were compelled to leave for their respective home states. We are conducting online classes through different online platforms since then. Specifically, all of our faculty members in NIT Meghalaya are using “Google Classroom” for conducting the online classes. Also, at the same time this “Autumn 2020” Semester, we conducted the lab classes. As much as possible, we make the student aware and learn about the technical and practical experiments based on their theoretical concepts. We have a “STUDENT ACTIVITY CENTRE (SAC)” with three wings: CULTURAL, SPORTS, and TECHNICAL. Through these respective three wings of SAC, we are conducting a few online activities like EBSB. A few students also participated in the annual essay writing competition, annual painting competition, poster presentation, etc.

TEAM: Sir, there are many international students at the National Institute of Technology-Meghalaya. What are the steps taken to ensure their safety at hostels?

DEAN (SW): There are totally around 20 International students staying in NIT-Meghalaya hostels. They didn't go back to their countries since the start of the pandemic. So we made them remain in the hostel itself. We provided them fresh and healthy food all the time. We imposed rules for everyone to follow social distancing norms and take precautions. We didn't give any break to the cleaning staff of hostels. They kept on working to maintain the sanitization and cleanliness of hostels. The hostels are sanitized twice a week. Regular interaction is also there between wardens and caretakers. So far we didn't find any problem from their side. Our institute medical officer also maintained the record of international student's health status. As of now, there is no negative news received by them.

TEAM: Sir, with regards to COVID -19, what are the measures to prevent the students from being infected after resuming the traditional offline mode of teaching?

DEAN (SW): Initially, we have resumed the traditional offline mode of education only for Ph.D. Students. In the last week of September, we sent a notification saying the optional resumption of research work for Ph.D. students. Primarily we arranged a hostel for boys and girls. So the students, as soon as they return to Shillong, are supposed to be quarantined in those hostels for ten days. Hostels used for quarantine stay are sanitized twice a day. Food was served directly to their rooms. They were supposed to not come out of their rooms. They were provided with all the necessary facilities in the room itself. Every day the hostel caretaker was called by our institute medical officer enquiring about the health status of each student who was quarantined. As soon as the ten-day quarantine period is completed, the students were advised to come out if the hostels(quarantine centers) visit nearby government recognized health centers and collect the feed certificates. Based on that certificate students were allowed to shift to their respective hostels. And then after the

permission from Dean(SW) Office, they can join the institute. In this way, we have managed the resumption of the offline mode of learning for Ph.D. and PG students.

Now it's the major challenge to bring back B-Tech students because they are huge in number. We yet didn't receive any notification from the government. But once if we receive a notification from the government side, we will follow phase-wise resumption of classes for B-Tech students. However, it's not finalized. Since final year B-Tech students are more critical because they need to undergo campus placements and other essential activities, we may call final year students first. The same procedure and same SOP will be followed for these students after returning to Shillong. If any final year student with their RT-PCR test (in their respective home places itself) found negative, within 72 hours of their arrival in Shillong, it is not required for them to be quarantined for ten days. After a simple regular medical check-up, they will be allowed to join the institute. So we will be following the same government norms unless otherwise, anything serious happens afterward.

After placing the final year students in hostels, the 3rd-year batch will be called. Now once after the resumption of all four batches, to avoid the crowding in the institute and to follow the social distance norms we may not call all B-Tech batch students into the institute to attend the classes. One day a part of the 1st year B-Tech student will be present and the remaining take the online class mode. These kinds of precautions will be accepted.

We already have a special tie-up with Nazareth hospital. This hospital accepts severe COVID cases. So if anything goes wrong and in emergency cases, we made arrangements for the remaining course of treatment. Also, if any person is tested positive for COVID with mild symptoms, then they were provided with a separate hostel with all the care and treatment provided. In this way, we are planning to take measures for student's safety.

RESEARCH HIGHLIGHTS

“AN INVESTIGATION INTO THE IDENTIFICATION OF POTENTIAL INHIBITORS OF SARS-COV-2 MAIN PROTEASE USING MOLECULAR DOCKING STUDY”



Sourav Das, Sharat Sarmah and Sona Lyndem under the supervision of **Dr. Atanu Singha Roy, Assistant Professor, HoD, Department of Chemistry, NITM** has recently published an article in *Journal of Biomolecular Structure & Dynamics*. The article presents an outline of the novel coronavirus (COVID-19) that originated in Wuhan,

China, which has caused a global pandemic affecting about 53,766,728 of people and resulting in the death of 1,308,975 as on 15th November 2020. COVID-19 patients may suffer from severe acute respiratory syndrome which might result in death due to massive alveolar damage and progressive respiratory failure. At present numerous clinical trials are underway to develop vaccines and identify drugs for the treatment of SARS-CoV-2 virus. The main protease (M^{pro}) of SARS-CoV-2, as in other coronavirus, plays a significant role in the viral maturation by processing many polyproteins that are translated from the viral RNA. Hence, the inhibition of the SARS-CoV-2 main protease is necessary for the blockage of the viral replication. Repurposing of already known drugs and molecules is an essential concept, especially in this pandemic, as it is cost-effective in terms of research and development of new novel drug molecules. Sir James Black, the recipient of the 1988 Nobel Prize in Physiology and Medicine, had famously stated that “The most fruitful basis for the discovery of a new drug is to start with an old drug”. Based on the above discussion we carried out blind molecular docking studies to identify the possible inhibitors of the SARS-CoV-2 main protease (M^{pro}), by screening a total of 33 molecules. These molecules could bind to the active site of M^{pro} , out of which rutin showed highest inhibitor efficiency among the 33 molecules studied, followed by Ritonavir, Emetine, Hesperidin, Lopinavir and ndinavir. Though, this finding indicates a promising potential for the use of small molecules for the treatment of COVID-19, but as this research is focused on molecular docking, rigorous wet-lab experimentation and clinical trials under both in vitro and in vivo conditions are needed.

“TECHNIQUE FOR TWO-DIMENSIONAL NEAREST NEIGHBOUR REALISATION OF QUANTUM CIRCUITS USING WEIGHTED LOOK-AHEAD”



Lalengmawia Chhangte, under the supervision of Dr. Alok Chakrabarty, Assistant Professor, Department of CSE, NITM has recently published a peer-reviewed article in *IET Computers and Digital Techniques*. The work specifically highlights the mapping problem on quantum computers that are based on technologies like superconducting and quantum dots. The mapping problem solves the restrictions on physical qubits that requires all

interacting qubits to be adjacent. The way qubits are placed in the hardware as well as the approach used for re-ordering qubits are very significant for reducing the overhead. The initial placement of qubits and the swap gate insertion techniques affect the circuit cost. The authors proposed a global qubit ordering technique that considers fewer permutations for the number of interactions a qubit does with other qubits of its circuit. They also performed the local re-ordering of qubits by attempting to reduce the cost as much as possible; the cost is estimated by defining a window with weights assigned in such a way that nearby gates to the current gate in question are given higher weightage. Experiments have been conducted on NCV benchmarks, and results have been compared with those of recent state-of-the-art techniques. When compared with the existing works, the proposed method shows improvements of up to 53.3% for smaller benchmarks and up to 51.61% for larger benchmarks. Real quantum computers have been deployed in the cloud by IBM for broad access. The future direction is to test the effectiveness of the proposed algorithm in real quantum computers.

"A SWITCHED-CAPACITOR SELF-BALANCED HIGH-GAIN MULTILEVEL INVERTER EMPLOYING A SINGLE DC SOURCE"



K. P. Panda, P. R. Bana under the supervision of **G. Panda, Professor, Department of EE, NITM** has published an article in *IEEE Transactions on Circuits and Systems II: Express Briefs*. Their work highlights the increased penetration of distributed energy resources and interest in improved grid reliability, power quality, and resiliency has changed the characteristics of distribution

systems. Among the different renewable energy sources, photovoltaic (PV) plants are regarded as the fastest-growing and most crucial technologies for the distribution systems. The grid-tied PV

systems typically consist of power electronics interfaces such as boost converter (boosts the direct current from PV system to match with the required load level) and inverter (converts direct current to alternating current that is fed to the load/grid). Thus, the proper operation of the PV system mainly depends on the effective design and control of the inverter. The traditional inverter topology produces a two/three-level voltage output that contains high harmonics. With the advancement of power converter technology, multilevel inverters (MLI) were developed, which can produce a higher voltage level from many input voltage sources (or multiple PV panels). As the number of levels increases, the output becomes more sinusoidal, resulting in fewer harmonics in the output. However, a key issue of the existing MLI structures is the requirement of higher number of semiconductor switches and multiple input sources. To increase the overall efficiency of the PV systems, a new MLI is proposed consisting of a single source, reduced number of switches and inherent voltage boosting ability (thus avoids the use of additional boost converter in PV systems). The high voltage boosting ability from a single source, unlike the existing circuit configurations makes the proposed topology more elegant for industrial applications.

"MESOMORPHIC, ELECTRO-OPTIC AND DIELECTRIC BEHAVIOUR OF A SEMI-FLUORINATED CHIRAL LIQUID CRYSTALLINE MATERIAL FORMING POLAR SMECTIC PHASES"



Deepak Gupta, under the supervision of **Dr. Ayon Bhattacharjee, Professor, Department of PH, NITM** has recently published a peer-reviewed article in *Journal of Molecular Structure*. In their work, they studied a fluorosubstituted compound (1F6T(2F)) exhibiting polar smectic phases in higher temperature range, characterized by DFT, vibrational, dielectric, and electro-optical techniques. The DFT studies showcase strong

relationship between the molecular geometry and properties of 1F6T(2F). It is found that the molecular architecture of the chiral 1F6T(2F) generates a lateral dipole moment and induces lamellar, tilted, and stable smectic phases in higher temperature region. HOMO-LUMO analysis reveals that the energy bandgap of the compound is large, and it lies in the UV region. The dielectric spectroscopy highlights the presence of PH relaxation mode in antiferroelectric (SmCA*) phase, goldstone and soft modes in ferroelectric (SmC*) phase. The compound has a spontaneous polarization of 7.95 ± 0.50 nC/cm² in SmC* phase. The response time of 1F6T(2F) is observed to fall monotonically with temperature. The studied compound could be used as a host medium for dispersing nano-sized particles or as an essential component in the multi-component mixtures to produce optically active mesogens with improved electro-optical properties.

FACULTY ACHIEVEMENTS



Dr. P. Rangababu, Assistant Professor and HoD, Department of ECE was awarded **IETE Fellow** from IETE during **April 2020**.



Dr. Rakesh Roy, Assistant Professor, Department of EE, had developed simple, special, and low-cost hand gloves soon after the pandemic outbreak. The gloves were designed to minimize the spreading of the Coronavirus. He indeed observed that human hands are mainly responsible for spreading viruses; hence it is necessary to halt them at the hands itself. The gloves are designed not only to protect humans but also to devastate the virus from the surface of different objects. These gloves will serve as an aid to doctors, nurses, staff, police, and others who stand at a high risk of getting infected by the Coronavirus. The auxiliary about these gloves is their reusability. He had submitted this project to **IEEE India COVID MOVE**- an Online Hackathon Challenge during **March 30- April 2, 2020**, along with nine other team members. The project secured the **III position** in the challenge. **Dr. Ramesh Pokhriyal Nishank**, Union Cabinet Minister for Education, Government of India, acknowledged and appreciated Dr. Roy's innovative work. The same was also recognized by **The Shillong Times**, a local daily, who had published an article entitled "**NIT faculty develops low-cost gloves to contain virus.**"

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Roy can be reached at royrakeshnit@gmail.com.

NOTABLE PUBLICATIONS

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my
GOV
मेरी सरकार

PROTECT YOURSELF & OTHERS FROM CORONAVIRUS!

Do's



Wash your hands more often or use hand sanitizer



Cover your nose and mouth while sneezing and coughing



Throw used tissues into closed bins



See a doctor if you feel unwell



Avoid large gatherings

Don'ts



Have a close contact with anyone, if you're experiencing cough & fever



Touch your eyes, nose and mouth



Spit in public

For further information:

Call Ministry of Health,

Govt. of India's 24x7

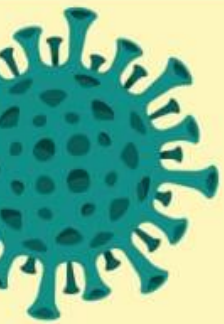
control room number

+ 91-11-2397 8046

Email at ncov2019@gmail.com

NOVEL RONA VIRUS (COVID-19)

LET'S DEFEAT IT



GOOD HYGIENE MAKES YOUR HOME SAFER



KEEP

your house clean
and well ventilated



DISINFECT

floors, doorknobs,
tables, tv remote etc.



WEAR

a mask only if you have cough,
fever or running nose



AVOID

touching your face,
nose, ears and mouth



WASH

your hands regularly with
soap and water for atleast
20 seconds



CONSULT

a doctor if you have any flu like
symptoms (fever, dry cough, cold
and difficulty in breathing)

For further information

Contact Ministry of Health and Family Welfare, Govt's 24 X 7 control room number: 011-2397 8046
or State Help line Number: 3852411668, Email at: ncov2019@gmail.com

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