Editorial

Saturday, November 9, 2019

The New India and the ticking time bomb

The making of a new India in the idea of Narendra Modi is moving towards its goal with the Supreme Court of India giving a landmark judgment in the Ayodhya case. Earlier, his government has abrogated the Article 370 of the Constitution of India which provided special status for the Jammu and Kashmir. Modi had tactfully handled the situation that everything is now settled without much noise. In the North Eastern part of the country, the decades old insurgency problem is nearing its end after one of the most hostile insurgence, which they consider as the mother of all insurgence group in the region has been tamed. It will not take even a week from today that the issue will be solved using any means.

The kind of activities carrying out by Narendra Modi government sees a political will even though it stands against the vision of many now has engraved trust to the integrity of the Indian political leaders. This will be a clear message to the world that no force can played the sentiments of the country.

The way Modi's government exercise its powers to fulfill the idea of New India sees support from all statutory bodies not to be left aside the Judiciary.

In today's landmark verdict of the Supreme Court, the venoms had been sucked from both Muslim who had been claiming the disputed and that of the Hindus who had been fighting for possessing the land which they believed to be the birth place of Lord Rama. Even as some Muslims are not happy they respect the judgment delivered by the 5 judge bench today.

While stating that the 1992 demolition of the 16th century Babri Masjid mosque was a violation of law, the Supreme Court has granted the entire 2.77 acre of disputed land in Ayodhya to deity Ram Lalla and directed the Centre and Uttar Pradesh government to allot an alternative 5 acre land to the Muslims at a prominent place to build a mosque.

The way the security measures being taken up across the country particularly in UP and central India, and the verdicts of the SC shows the need for every Indian to end the longest pending issue of Independent India. No politics is being allowed to be played by any individuals including his political parties. All were left with the SC and the verdict was well respected. Or else, the music of allotting 5 acres of land in merely like exchange of the 2.77 acres of land will not be faced.

The when all is going well with the idea of making a new India, something is seriously wrong by not respecting the history of the erstwhile kingdom of Manipur which was merged to the Indian Union in a controversial manner on October 15, 1949. Recognition to the history of this erstwhile kingdom and respect to it is seen left by Modi led government even as his recognition of the history of Naga as claim by NSCN-IM has been served. The left over issue if not solve in time will again remain as a ticking time bomb that will explode at any movement in the future to the making of the new India.

More state News

BPR Admin bags Digital Transformation Award 2019

DIPR
Bishnupur, Nov. 9

The District of Bishnupur under Neeta Arambam as the Deputy Commissioner has bagged the Governance Now Digital Transformation Award 2019 in recognition for its efforts to usher the adoption of digital in the district.

Speaking to the media persons in her office today, the commissioner said that the award is the result of the collective efforts of the staffs, CSOs, and the people. She added that in the past two years, debit card holders increased by 47.04% and business Correspondence from the 24 Gram Panchayats has increased from 24 to 35.

It might be mentioned that Bishnupur bagged Apollo Telemedicine Award in 2017 and Prime Minister's Award for Excellence in Public Administration 2018 on the category of promotion of digital payments in 2018.

Army Chief visits eastern theatre

PIB (DW)
Imphal, Nov 9

General BipinRawat, PVSM, UYSM, AVSM, YSM, SM, VSM, ADC, Chief of Army Staff (COAS) visited Spear Corps at Dimapur, Kohima and Headquarter Eastern Command, Kolkata on 07 – 08 Nov 2019. On 07 Nov the COAS had detailed discussion with Senior Military and Civil Officials including Chairman Cease Fire Monitoring Group and the Honourable Governor on the security situation in the hinterland, along the Borders and possible way ahead. The Army Chief discussed security situation in the State and apprised the Hon'ble Governor of the actions being taken by the Indian Army and Assam Rifles in coordination with civilian agencies, in maintaining peace and tranquility in the state and along the Indo-Myanmar border. At Rangapahar Mil Station the COAS interacted with officers and men and exhorted them to continue working for the cause of the organisation. The COAS, during his visit also interacted with officers and soldiers of Headquarter Eastern Command at Kolkata on 08 Nov 2019. He praised them for their professionalism and exhorted the troops to continue to work with zeal and dedication to overcome all challenges in the future. The COAS appreciated the high standards of operational readiness and expressed his confidence over the capability of the formations in the Eastern Command theatre.

***Letters, Feedback and Suggestions to* 'Imphal Times'**
can be sent to our e-mail : imphaltimes@gmail.com.
For advertisement kindy contact: - 0385-2452159 (O).
For time being readers can reach the office at Cell Phone No. 9862860745 for any purpose.

Attempts to Recharging the World with Li-ion Battery Leads to Chemistry Nobel Prize-2019

(A popular article on the development of Battery)

By - Prof. Homendra Naorem
Department of Chemisry, Manipur University

In a state like Manipur where the socio-political-cultural issues continue to eclipse every other issues (and justifiably so sometimes), important events like the announcement of the Nobel Prizes understandably fails to hit the headline of any local dailies or topic of discussion or create any ripple in the state,save the minority scientific community in the state. With clock-like regularity, the Royal Swedish Academy of Sciences has announced that the Nobel Prize in Chemistry for the year 2019 would be given to three Chemists:(i) John B. Goodenough, 97, Professor at the University of Texas; (ii) M. Stanley Whittingham, 77, Chemistry Professor at the State University of New York at Binghamton, and (iii) Akira Yoshino, 71, of Asahi Kasei Corporation and Chemistry Professor at Meijo University, Japan for 'their work leading to the development of lithium-ion batteries, which have reshaped energy storage and transformed cars, mobile phones and many other devices — and reduced reliance on fossil fuels that contribute to global warming'.Humankind has hugely benefitted and continues to benefit from their scientific researches. It is without any doubt a befitting tribute to the memory of Alfred Nobel, the Chemist, who instituted the Prize by donating his life time earnings to ensure the fruit of scientific research benefits the humankind. The prize carries an amount of 9 million Swedish krona (about ' 7 crore), to be shared equally among the Laureates. What is a battery or to be precise lithium-ion battery?

The term battery now is so common and popular that it hardly needs any explanation. But when it comes to who first coined the term, one needs to google! The word 'battery' of course means a series of objects grouped together to perform a function, like a battery of artillery or a battery of tests, etc. It was Benjamin Franklin who first used the term 'battery' in 1749to describe a series of capacitors linked together for his 'electricity experiments'. Later, the term was used to denote electrochemical cells linked together for the purpose of providing electric power by Italian Physicist, Luigi Galvani (associated with Galvanic cell) using mostly copper and zinc rods (electrodes) immersed in acidic solution (electrolyte). While trying to produce energy from chemical reactions, Alessandro Volta created the first batteryin 1800known as the 'Voltaic pile', which can produce stable supply of electric current. Despite its two major problems - the leakage of the liquid electrolyte and short life span (about an hour) - the voltaic battery in different forms was in use for more than hundred years! The leakage problem was circumvented by laying the voltaic pile on its side to form it as 'trough battery' by William Cruickshank of Scotland. In 1835, William Sturgeon demonstrated that the short life span of the voltaic pile caused by the degradation of the zinc due to impurities and a build-up of hydrogen bubbles on the copper could be increased by treating zinc with mercury which preventedthe rapid degradation of zinc.A breakthrough in battery came in 1836 when the British Chemist John F Daniell invented the so-called 'Daniel cell' using a second electrolyte that reacted with the hydrogen, preventing its build-up on the copper cathode – copper dipped in copper sulphate solution and zinc dipped in zinc sulphate solution which were interconnected through a porous membrane (or salt bridge). Its impact was so much that Daniell's two-electrolyte battery was instrumental in the functioning of the then budding telegraph networks in Britain and elsewhere.Most of the batteries until 1800 were in a 'liquid state'and suffered from poor maneuverity.A real breakthrough in battery came in 1866 when Georges Leclanché created a battery using azinc anode, a manganese dioxide cathode, and an ammonium chloride solution as the electrolyte, which eventually led to the development of the dry cell with the introduction of an electrolyte paste out of ammonium chloride and plaster of paris byCarl Gassner. Hepatented the new 'dry cell' battery in 1886 in Germany. In the 1950s, the Union Carbide company introduced 'Eveready'dry cells by replacing the ammonium chloride electrolyte with an alkaline substance, based on the chemical formulation of Jungner in 1899. Alkaline dry cell batteries could hold more energy than zinc carbon batteries of the same size and had a longer shelf life.Alkaline batteries rose in popularity in the 1960sovertakingthe zinc-carbon batteries, and become the standard cell. Since the chemical reactions in such cells are not reversible, the battery will not be able to produce current once the reactions come to completion or equilibrium causing the battery to be dead. Such batteries are known as primary batteries. Can one develop a battery based on a reversible chemical reaction avoid the unwanted dead of the battery? The thought has given rise to the birth of secondary or rechargeable battery. But before that, let us try to understand the working principle of a battery from scientific perspectives.

In the realm of electrochemistry, there are broadly two types of cells: (i) Electrolytic Cell in which an electric current causes a chemical reaction to take place and (ii) Electrochemical (Galvanic)Cell in which electric current is produced as a result of a chemical reaction. A cell has necessarily three components, apositive electrode, a negative electrode (known as anode and cathode respectively)and some kind of electrolyte that separates and chemically reacts with the electrodes and also allows the flow of electrical charges between the electrodes.A battery is a combination of one or more such cells (joined in series, parallel or both) whose chemical reactions create a flow of electrons (electric current) in a circuit.However, in a commercial battery, the electrodes are generally indicated in the form of terminals, a + terminal (sign on the battery) indicates the cathode while the anode is indicated by a –terminal; anodes and cathodes should not confused with + or – veterminals of the battery.When the terminals of a battery are connected to an external circuit, oxidation (loss of electron) occurs at the anode generating cations (positively charged species) and electrons. The electrons flow through the circuit and the cations through the electrolyte to the cathodewhere reduction (gain of electrons) takes place. When the material in the anode or cathode is consumed or no more chemical reaction occurs, the battery will no longer produce any current and hence is said to be dead. That is exactly what happens in a primary battery. On the other hand, in secondary cells or batteries,the chemical reaction may be reversed by passage of an external current making them 'rechargeable batteries'. In otherwords, a rechargeable battery functions not only as electrochemical cells while discharging but also as electrolytic cells while recharging.

Perhaps the first rechargeable battery was created by the French Physicist Gaston Planté in 1859 using two rolled sheets of lead submerged in sulfuric acid. The advantage of such batteries is that the chemical reactions in the battery may be reversed when an external current is passed through it.Another major improvement came in 1881 when Camille Alphonse Faure introduced lead plates instead of sheets laying the foundation for the modern day lead acid battery which are still widely used in automobiles and other industries.It however employs a liquid electrolyte limiting its portability and user-friendliness. Such batteries are not suitable for small hand held electronic devices like radio, mobile, or communication satellites, etc. A portable form of rechargeable battery based on nickel oxide hydroxide and metallic cadmium as electrodes, known as 'Ni–Cd' battery, was created by Jungner of Sweden in 1899 which was widely used in portable power tools, electronic devices, etc.In another major breakthrough, COMSAT (Communications Satellite Corporation) developed the nickel-hydrogen battery for use in communication satellites in 1970s with the storageof hydrogen in a pressurized, gaseous form. In around 1989, several companies launched the nickel-metal hydride (NiMH) batteryin the consumer market providing a smaller, cheaper alternative to the rechargeable nickel-hydrogen cells.The rechargeable batteries like Ni-Cd, Ni-H, NiMH, ruled the market until the entry of the Lithium-ion battery in 1991 that revolutionized the world of battery!Why lithium? Are the metals chosen arbitrarily? Metals are chosen not arbitrarily but on the basis of their tendency to loseelectrons (oxidation) as indicated by the so called standard oxidationpotential (SOP). Lithium the lightest metal has the highest SOPof about 3.05 Volt, for zinc and Ni it is 0.76 and 0.25V respectively while copper has -0.35V. It basically means that if zinc and copper were to be left in open air zinc will get corroded(oxidize to Zn^{+2} ions) faster while copper would remain almost unaffected. Because of the high oxidation potential, lithium has always be the preferred metal but for its reactive and explosive nature when in contact with air or water.

The pace with which the invention of Lithium-ion battery gained owesperhapsto the oil crisis during mid 60s and 70s when chemists like Whittingham working on the development of fossil fuel free energy sources. He tried to develop battery using lithium metal as anodic material instead of nickel or other metals. How about the cathode? Then came the most innovative creation from Whittingham who developed acathode for the lithium battery using titanium disulphide which can intercalate lithium ions in it.Only chemist can tailor-make such materials infused with desired properties! He then developed a battery with just over 2 Volts using a lithium based liquid electrolyte but it has huge potential for future developments. In such battery, lithium ions produced at the anode moves through the electrolyte to the cathode while the electrons from the anode flow through the external circuit and eventually to the cathode while discharging. But because lithium is highly reactive, such battery always ran high risk of getting exploded unless handle carefully. Around this time, another chemist, Goodenough not only predicted but synthesized a metal oxide that can intercalate lithium ions to demonstrate that a metal oxide and not sulfide is a better candidate forthe cathode. In 1980, Goodenough reported that when cobalt oxide intercalated lithium ions is used, it can produce as much as 4 volts. Following the results of Whittingham and Goodenough, Akira Yoshino for the first time in 1985 built the commercially viable lithium-ion batteryusing a carbon material (known as petroleum coke)intercalated with lithium thereby making it much less prone to explosion that was there with metallic lithium. Eventually, Sony marketed the first commercial lithium-ion battery in 1991. Unlike other rechargeable batteries, lithium ion battery is not based on a reversible chemical reaction that eventually consumed the electrodes buton the flow of lithium ions from the anode to the cathode through an electrolyte while discharging and from the cathode to the anode on recharging. In order to minimize the risk of getting the electrodes short-circuited in case the electrolytes get evaporated due to the heat generated in the process, a micro-porous polymeric insulator permeable to lithium ions in the form of 'separator' coated with the electrolyte is employed. This greatly reduces the possibility of the battery getting exploded while recharging. At present, a typical lithium-ion battery uses lithium intercalated graphite (LiC_6) and lithium intercalated metal oxide ($LiCoO_2$)as the electrodes and an alkyl carbonate $LiPF_6$ (for example) as the electrolyte. Most of the materials employed in the present day lithium ion battery are patented and hence their exact chemical compositions are not known.The fact that no alternative to lithium ion battery has ever been claimed in the last more than 30 years should vouch the importance of the lithium ion battery. It may be still in use in the next few decades perhaps with more added attributes! However, there are still researches towards bettering its discharge-recharge cycles from the present about 3000 to about 10,000 cycles (about 20 years – one battery for life time!) and to increase its single cell voltage from about 3-4 Volts by five folds, current density, etc. One of the tricks in achieving the goals among othersis replacing the lithium ion storage medium from graphite to silicon or silicon based materials which can effectively but reversibly intercalate the lithium ions.

With the announcement of this Year's Prize, Prof John B. Goodenoughat 97 years stands out as the oldest person to receive a Nobel Prize in any discipline! Even at this age, he still goes to his research lab every day. More than the Nobel Prize, he is more concerned, as he revealed, with the completion of the doctoral program (PhD) of his final student working on batteries! He further commented, 'I don't know when I'll be taken. But I suppose it'll be one of these days soon. At my age I don't take someone on who is going to do a four-year PhD stint. My last student is a pretty good boy. I plan to see him graduate. That's my plan. But of course I'm not in control. I live day by day, that's all I can do'. Compare it with the working environment in most of the Indian (including Manipur) Universities where any scientistafter 65, is treated more like a trespasser than a possible source of innovative ideas,thoughts, expertise, let alone guiding a research scholar - the scientist is asked to abandon his research well before 3 years prior to his attaining the magic 65 years. Will the award of this year's Nobel Prize to a nonagenarian who still is actively engaged in research cut any ice with the younger generation in pursuit of knowledge and wisdom!

Edited by Rinku Khumukcham, Owned and Published by Iboyaima Khuman at Keishamthong Elangbam Leikai, Imphal and Printed by him at M/s Imphal Times Printers, Elangbam Leikai Imphal West, Contact No. 2452159, Resident Editor- Jeet Akojjam