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A Study on Vegetative and Fruits Electrochemical Cells: Physics and Technology

Md. Kamrul Alam Khan
Jagannath University, Bangladesh

The need of electricity arises alarmingly with time in the development of any country. Countries which are still in development are focusing to generate electricity in the all achievable ways. But providing electricity at off-grid has always been a predicament although their demand is not much but to use bulbs and operate some small electrical communication equipments. Socio-economic environment of developing countries are not ample and feasible to connect those areas with grid lines. A new technique of utilizing the neighboring biological elements to produce electricity was found where the voltaic cell technique is used. Conventional environmentally unfriendly non-renewable energy resources are exhausting rapidly, which is forced to search for alternative renewable resources such as solar, wind, tidal-wave and biomass etc. To keep it in mind it is trying to supply electricity from the biomass resources such as some vegetative and fruits like Pathor Kuchi Leaf (PKL), Arum Leaf, Tomato, Myrobalan, Aloe Vera and Lemon electrochemical cells. Our studies on ionic pressure with electrical parameters and the change in surface structure of electrodes for different biological elements showed a better way to optimize the electrical outputs at an affordable cost to generate electricity throughout the year.The experiments were performed with atomic Absorption Spectrometer (AAS), Ultra Violet visible Spectrometer (UV-VS), XRD, SEM, VSM, FTIR, FESEM, EDX and GC-MS techniques to establish the quality and quantity of electricity generation. We optimized the all to develop a cost-effective vegetative and fruits battery by modification of electrodes. The vegetative and fruits battery efficiency, energy density, power density, capacity were calculated. We also investigated the self discharge profile of the vegetative and fruits battery and identified the emitted gas. We found that the potential and current decrease with increase of concentration of Zn2+ ions in vegetative and fruits extract as well as with concentration of Cu2+ and H+ ions the change of concentration of ions was confirmed by pH measurement. The presence of secondary salt in vegetative and fruits extract influences the current and potential significantly because of the presence of secondary salt. The highest efficiency of electricity was established at 42% concentration of vegetative and fruits extract. We observed that vegetative and fruits have around pH 4.5 with 10% water and 4.0 without water. Investigation showed that the electricity generated with vegetative and fruits extract is cheaper compared with other renewable energy sources and the conventional gas based electricity. The electrical and chemical properties of vegetative and fruits electricity have been studied. The variation of voltage, current with variation of concentration of Zn 2+, Cu2+ ions and time has been measured. We find zinc based fertilizer as a bi-product of vegetative and fruits power device, which contains hydrogen gas as well as methane gas. Variation of concentration of Zn2+ and Cu2+ ions with secondary salt (CuSO4,H2O), MnO2 using PKL extract, water and vegetative and fruits extract have been studied. However, Nanoparticles (NPs) have been synthesized using PKL extract for practical applications to generate electricity from vegetative and fruits electrochemical cells. In this study, manganese dioxide (MnO2) nanoparticles (NPs) were produced by using KMnO4 as a precursor and Bryophylum pinnatum leaf extract as a source of reducing agent. The XRD (X-ray diffraction) study revealed the preparation of nanocrystalline MnO2 with cubic crystal structure. The presence of capping agents on the synthesized MnO2 NPs was confirmed by the Fourier Transform Infrared (FTIR) analysis. The surface morphology was examined with the Scanning Electron Microscopy (SEM) and found to be cubic grain with homogeneous distribution. The thermal analysis was carried out using Thermo gravimetric (TGA) analysis. EDX analysis demonstrates the presence of Mn and O2 including their composition. However, the VSM analysis indicates the ferromagnetic effect of nanoparticles. The synthesized MnO2 NPs were used in modified galvanic cell to generate electricity in which water and vegetative and fruits extract was used as solvent. We review briefly the known manufacturer of commercial Bryophyllum Pinnatum Leaf (BPL) devices known as Locally PKL power system and some other vegetative and fruits battery system. The PKL system can achieve higher efficiency than the other vegetative and fruits. It was shown that the electrical efficiency of BPL or PKL system is of higher efficiency than the other vegetative and fruits system. These systems are analyzed with respect to the design and the electrical energy output for a construction and under the climatic condition of Bangladesh. The work gives the guide line for a new electricity generation technique through the vegetative and fruits system.

kakhan01@yahoo.com