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Analysis of Mixture Paste of Cassava Peel and Pineapple Peel as Electrolytes in Bio Battery

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ABSTRACT

This study investigated the effect of the ratio of the electrolyte paste mixture of cassava peel (CP) and pineapple peel (PP) on the voltage and current strength. In the experiments, prior to using, CP and PP biomass waste was cleaned then soaked for 30 minutes. Furthermore, the biomass waste is mashed and put into the test media according to the comparison. In this study, CP/PP compositions were varied with the value of 100: 0, 75:25, 50:50, 25:75, and 0: 100. The results showed that the highest electrolyte obtained by voltage and current strength with a ratio of 100: 0. The more CP comparisons used, the greater the voltage and strong current. This research is potentially used as one of the renewable alternative energies and can utilize existing biomass waste.

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1. INTRODUCTION

This bio battery research using cassava peel (CP) and pineapple peel (PP) electrolyte is important to do because it can create renewable alternative energy and can utilize biomass waste optimally. Substances in fruits and vegetables such as ascorbic acid and citric acid have the potential to produce energy cells, which under certain conditions these chemicals can act as electrolytes (Fauzia *et al.*, 2019).

Similar studies have been carried out, such as research that utilizes the skin of the zalacca fruit which is used as active porous carbon as anode in sodium ion batteries (Arie *et al*., 2018), research on electrolyte paste characteristics of tropical almond fruit (Togibasa *et al*., 2019), banana peel as a battery material with a porous structure (Zhang *et al*., 2016), bio battery from areca peel paste (Ansanay *et al.*, 2019), and studies utilizing papaya fruit for sugar-air alkaline battery (Proyera *et al*., 2016). However, there is no study about the bio battery with the electrolyte mixture of pineapple peel and cassava peel.

This study aims to determine the best voltage and current strength of the electrolyte mixture of cassava peel paste and pineapple peel paste. This research was conducted with an experimental method which was carried out in two stages, namely the manufacture of the electrical characteristics of cassava peel and pineapple peel, and testing the electrolyte characteristics of cassava peel and pineapple peel. The main novelties in this study are (1) using electrolyte paste of cassava peel and pineapple peel on a bio-battery, (2) testing voltage and current of cassava peel and pineapple peel as electrolytes in bio-battery, and (3) comparing performance of cassava peel and pineapple peel composition as electrolyte in bio-batter.

2. METHODS

Bio-battery manufacture. Bio-battery were made from the mixture of CP and PP. All materials were obtained from Pangandaran Regency, Indonesia. The used batteries in this study are AA 1.5 volt ABC batteries. **Figure 1** shows the process of making bio-battery in this study. This study used the variable comparison of CP and PP biomass which varied in to 100: 0, 75:25, 50:50, 25:75, and 0:100. Bio-battery performance analysis. We desired bio-battery that have high voltage, high current, and could turn on an electronic object. We did some bio-battery property tests to check the bio-battery voltage, current, and also test the bio-battery to turn on the 1.2V LED light.

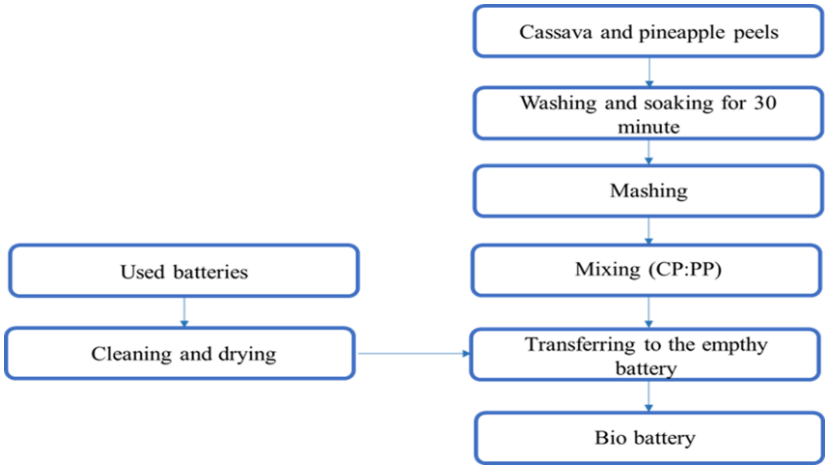

Figure 1. The process of making bio-battery.

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3. RESULTS AND DISCUSSION

Table 1 shows the results of measurements of voltage and electric current resulting from variations in the electrolyte composition of a mixture of cassava peel and pineapple peel. Cassava peel and pineapple peel can generate electrical energy because it has acidic compounds that can generate electric current (Supriyanto *et al.*, 2019). Based on the data in the table, the amount of voltage and current produced varies, depending on the composition of the mixture. This is due to differences in the content of acidic compounds in the cassava peel and pineapple peel. Cassava peel contains acidic compounds such as acetic acid (CH3COOH) and cyanide acid (HCN) (Supriyanto *et al.*, 2019). Meanwhile, pineapple peel contains Citric acid (C6H8O7) (Kareem *et al.*, 2010).

The H+ ions and Zn metal (Akbar, Armelianda, and Muttakin, 2018). The mixture of cassava peel pastes and pineapple peel paste acts as a reducing electrolyte. Based on standard reference data, the standard potential of Zn is 0.76 V and H+ is 0 V (Tuurala *et al*., 2015). This is in accordance with our research that the resulting voltage varies between 0.70-0.83 V.

In this research, bio-battery with cassava peels paste and pineapple peel paste has been tested in turn on the 1.2 V LED lamp. **Figure 2** shows that the bio battery can turn on the 1.2 V LED light using 3 batteries in series. It shows that the electrolyte potential of the fruit can be used as an alternative energy.

4. CONCLUSION

This study aims to determine the effect of the ratio of the electrolyte paste mixture of cassava peel (CP) and pineapple peel (PP) on the voltage and current strength. The mixture of battery electrolyte paste with the best voltage and current is the CP and PP ratio of 100: 0. The more CP comparisons used, the greater the voltage and strong current. This research is potentially used as one of the renewable alternative energies and can utilize existing biomass waste.

Tabel 1. The result of bio-battery performance analysis.

Electrolyte Variation (CP : PP)	Average voltage (V)	Average Current (mA)
100:0	0.83	0.79
75:25	0.79	0.79
50:50	0.75	0.74
25:75	0.73	0.54
0:100	0.73	0.64

Figure 2. Application of bio battery with fruit electrolyte to LED light.

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5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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