## 5. Study on Surface Electricity. (VI)

On U-Effect.

*Shizuo Ueda, Fukuji Tsuji* and *Akira Watanabe.*

When we disturb the electrical double layer in a glass capillary be a vibrating source like sonic or supersonic wave, we find the generation of an alternating voltage of the same wave character (wave form and frequency etc.) at the two ends of the capillary. We call this U-effect. We proved this experimentally in two cases; glass-dil. salt solution interfaces and sulphuric acid-mercury interfaces. As the vibrating source, we applied always sonic of supersonic wave of sine wave form, and observed the potential generated with cathode ray oscillograph set. We got quite sufficient results to fulfil this condition.

The theoretical treatise of this is as follows. In case of the electrical double layer of glass-electrolyte solution interface, we apply Helmholtz's formula and consider the pressure $P$ to be periodical function of time. This leads to the periodical change of streaming potential $E$. In case of sulphuric acid-mercury interface we consider this interface as an ideal polarized electrode, and the alternating voltage occurs in compliance with the periodical change of the interface area $s$. That is, when we put $s=s_0\, e^{i\omega t}$ and the electrical density of the interface $\sigma$, the electrical quantity at the interface is given by $q=\sigma s_0\, e^{i\omega t}$.

As the application of U-effect we have almost accomplished the device of pick-up of electrophone and microphone. It was also clarifyed that the fish locator applied with this device is as effective as that with Rochelle salt, and that this effect can be applied with as good result as with the Rochelle salt for the point of conversion devices from mechanical energy of vibration to electrical energy, such as that of cardiograph, stethoscope and mouthpiece of telephone etc.

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## 6. Study on Surface Electricity. (VII)

Measurement of Streaming Potential by Vibration Method.

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When fluid is forced by pressure through a diaphragm or capillary an electromotive force, so called "streaming potential", is generated. Up to the present constant pressure has been used and the streaming potential has been measured by electrostatic method. But we used periodically changing pressure, e. g. simple harmonic motion of moving coil, and succeeded in measuring the potential as an alternating voltage. Applying this method, we first measured the streaming poten-