A Novel Type of Piezoelectric Device: Development and Utilization of Bio Piezoelectric Device Using Jellyfish Collagen

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Currently, materials of piezoelectric devices mainly used have several disadvantages that they are partially toxic, inappropriate for the human body, difficult to manufacture, or expensive. Therefore, to use it as an environmentally friendly and harmless bio piezoelectric device, we tried to develop a piezoelectric element using collagen. In this study, jellyfish which cause damage due to an increase in population were used as a material for piezoelectric devices. Collagen was extracted from jellyfish and produced based on piezoelectric devices using gelatin. Based on this, piezoelectric devices were made. Furthermore, a silicon-cased bio piezoelectric device has been developed to freely control the ductility of a bio piezoelectric device and to improve impact resistance and fatigue resistance. As a result of measuring the output voltage of the developed piezoelectric device using the PASCO voltage sensor, the maximum voltage was 4.6V when struck and the maximum voltage was 1.2V when bent. The generated electricity can operate LED lights and small medical devices. As a biosensor, muscle movement can be analyzed according to the degree of voltage generation when bending. In addition, as a bio-piezoelectric element, it was confirmed that the flexibility was excellent enough to not be damaged even when bent 180 degrees after being attached to the elbow. As a new piezoelectric material to replace the disadvantages of the existing piezoelectric device, collagen from jellyfish detritus classified as bio-waste was used. A bio-piezoelectric device that is environmentally friendly, flexible, and has high fatigue resistance was manufactured, and it was confirmed that a maximum voltage of 4.6V was generated.