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## Unique Physical and Chemical Properties of Kian Sand Worm (*Siphonosoma ur-pulau*) Traditional Medicine: Electrical, Optical and Chemical Response of Edible Powder with Different Sizes

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### Abstract

Sea worms or sand worms were widely spread on earth generally in beach areas with a series of different taxonomy sizes. There made a variety of the genus as well as species of such interesting worms. This study explores that traditional medicines fabricated using Kian sand worm (*Siphonosoma ur-pulau*) with two types of grain sizes. Our significant findings show an attractive potential of it as toxic absorption based traditional medicine besides its normal use as daily foods in the Tual region of Maluku province in the eastern part of Indonesia. Such noteworthy identification was tested and identified in the grain rough size medicine with low concentration related to its integrated multitasking response of electrical, optical and chemical characters such as its lowest absorbance at a moderate transparency of 0.271 a.u (T~53.528%) pH ~5.09, and stable voltage under thermal effect ~0.7 V. This invention unlocks a various opportunity of the use of Kian sand worm as a multitasking traditional medicine.

**Keywords:** Kian sand worm (*Siphonosoma ur-pulau*), Traditional medicine, Toxic absorption, Multitasking traditional medicine.

### Introduction

The mystery of healthy natural foods involving herbal medicines extracted from parts of plants or traditional medicine made by parts of animals has been a long time trust among ordinary people with different tribes and nations in small villages or remote islands on earth. Such incredible simple science from generation to generation from ancient times has been an evident history inherited to current 21st century people worldwide. As the advancement of Nano medicine with multitasking understanding or multi-agent system is acceptable among interdisciplinary scientists as well as unconscious ordinary society, the life of healthy people has been a good example to improve cultural behaviors among person to person interactions daily in current ~7.8 billion world people [1-22].

Even though the space of human being on earth has been shrinking to be ~ 50.33 Person/km<sup>2</sup> in the whole living land area of earth surface. The momentum of lifestyle is a good source of energy contribution for maintaining human being healing such as both enzymatic and non-Enzymatic types of giant natural antioxidants to develop either herbal medicines or traditional medicine, for instance in sea or sand worms extracted and taken from the parts of sea worms [1-22]. Such

sand worms mostly stayed in the beach sand areas or a land surface on earth very closely connected to the ~70% of world seas/ oceans. Therefore, it is interesting to investigate their unique physical chemistry chemical physics characters for a possibility in integrated traditional medicine based on electrical, optical and chemical responses, respectively.

Many deep investigations have been carried out about different types and locations of sea or sand worms all over the world with their focuses on typical anatomy, environmental behaviors, and food processing and products by using the identification through DNA barcoding, molecular detection worm relationships novel antithrombotic protease protective effects of polysaccharides bioturbation and aquaculture, ecological impact and counterplan [1-4, 23-29]. In this simple and coherent study, the authors present on how Kian sand worm named as *Siphonosoma ur-pulau* found in the south east part of Maluku province in the eastern part of Indonesia with surrounding over 1340 small islands (~10% of the number of Indonesia islands), and particularly located mostly in Ur-Pulau, Tual region can exhibit a unique physical chemistry chemical physics behavior due to its integrated electrical, optical and chemical

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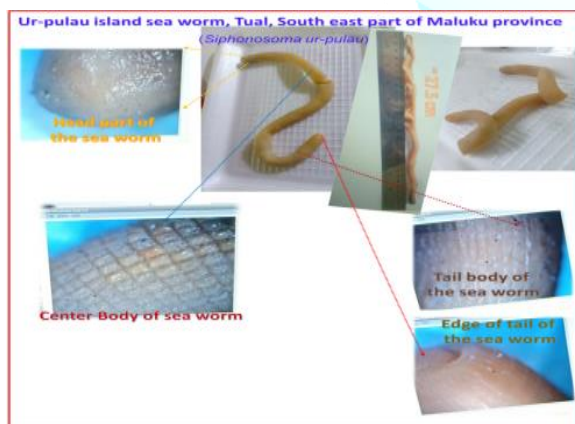


responses as traditional medicine identified by inserting as fabricated two types of grains traditional medicine based Kian sand worm. The results of this work suggest that Kian sand worm can be generally used as a multitasking traditional medicine as unconsciousness consumed daily food by ordinary local people in Tual region of the eastern part of Indonesia.

## Research Experimental Techniques

Kian sand worm (*Siphonosoma ur-pulau*) traditional medicine was fabricated using traditional modified technique in laboratory of nanomaterial's for photonics nanotechnology (Lab. N4PN, physics department at Pattimura university (UNPATI), Ambon, Indonesia) as well as nanotechnology research center and innovative creation (PPNRI, UNPATI). The worms were collected in the sand beach parts of Ur-pulau Island located in Tual region of Maluku province in the eastern part of Indonesia. (Figure 1) shows a typical anatomy of different body parts of *Siphonosoma ur-pulau*, a new species of sand worm. Such worm was often grouped as sea worm in the world wide view. However, the Kian sand worm was identified as one of the longest sand/sea worm on earth up to present as depicted in (Figure 2). Traditional herbal medicine using Kian sand worm was prepared by cooking it in a hotplate with the inner temperature pan of  $\sim 87.6^{\circ}\text{C}$  for few minutes.

The measured temperature during the frying time with an infrared thermometer was  $\sim 79.1^{\circ}\text{C}$  on the body of the Kian worm. The traditional medicine was then grinding into flour. After such process, the separation of the grain sizes was carried out using a separation tool that makes two types of different sizes namely as smooth and rough powders, respectively. In order to test both as prepared traditional medicines, a toxic target of betadine (a common outer-body wound medicine in Indonesia) solution in drinkable tape water was prepared with concentration of  $\sim 0.0678\text{ g/mL}$ . The color changing was observed carefully with real time camera to detect chemical process as well as optical absorption of the betadine toxic from the samples. The Electrical, Optical and Chemical (EOC) responses of eatable powder with two grain sizes were finally characterized by employing an integrated electronics and optical experimental setup in which the samples were put above a controllable temperature from a hotplate during voltage measurement in real time. The absorbance and transmittance response of the samples were recorded by employing UV-V is spectrometer operating from  $\sim 350\text{ nm}$  to  $950\text{ nm}$ . In addition, the chemical reaction was observed in the color indicator of solvent in real time under the influence of different temperature.



**Figure 1:** A unique anatomy appearance from head, body and tail of Kian sea worm (cacing Kian in Indonesia language based on the call in local language of Tual region, Maluku province or its Latino feliscan named as *Siphonosoma ur-pulau*) which leaves in the beach sand of Ur-pulau island captured using a USB mobile microscope.



**Figure 2:** Sample preparation: world sand worms living in different places on earth with its comparison with Kian sand worm, one of the longest so far.

## Results and Discussion

Depicts two types of traditional medicines as prepared with two different grains following by its testing results on facing betadine toxic in drinkable water solvent (Figure 3). The physical quick response of toxic absorption was indicated by the color changing from dark brown to be light yellow. (Figure 4) In order to find out the detail optical response of such interesting traditional medicines, shows that the high concentration of the rough powder as depicted on the right side of Figure 4 had both low absorbance and transmittance at  $\lambda \sim 390\text{ nm}$  of 1.053 a.u. and 8.858% respectively. While the low concentration of the rough powder was obtained to be superior at  $\lambda \sim 403.6\text{ nm}$  with the lowest Abs. of 0.271 a.u. and the largest transparency (T) of 53.528% among the four different traditional medicine samples with its ability to dramatically reduce the toxic by decreasing its absorbance from  $\sim 1.266\text{ a.u.}$  to  $\sim 0.271\text{ a.u.}$  at the nearest peak absorption in UV region. Such physical indicator could be seen in the naked eyes by the much more transparent solution after absorbing the toxic during instant interaction.



**Figure 3:** Traditional herbal medicine using Kian sand worm before the separation of the grain sizes and after the separation with the test in toxic target of betadine solution in drinkable tape water.





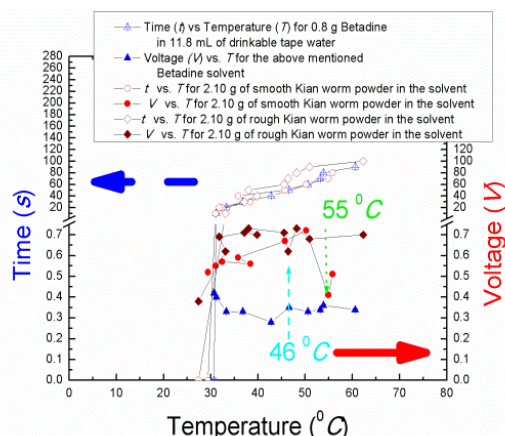
**Figure 4:** Optical behavior of traditional medicines in toxic target solvent. The left side (red lines) depicts the optical responses of two different concentrations of smooth powder with small grains traditional medicine. While the right side (green lines) is the rough grains traditional medicines with their responses on toxic absorption and transparency.

Indicates physical chemistry chemical physics properties of pH behavior for the whole fresh samples, and the physical appearance after 8 days in two prepared grain sizes of traditional medicine based Kian sand worm (**Figure 5**). The lowest concentration of rough powder was the most needed contributor to decrease the pH of toxic solution from 6.39 to be 5.09. This observation and measurement confirms the optical parts as shown in Figure 4.

To quantify the integrated understanding of electrical, optical and chemical response of eatable powders with two different sizes medicines, (**Figure 6**). denotes the physical chemistry chemical physics characters of traditional medicine made by Kian sand worm according to time ( $t$  in s) versus temperature ( $T$  in  $^{\circ}\text{C}$ ), and voltage ( $V$ ) versus  $T$ , respectively particularly in their reactions with the betadine toxic solvent. The traditional medicines show that there are about twice improvement of voltage in toxic solution from  $\sim 0.35$  V to be  $\sim 0.7$  V in different temperature up to  $\sim 62^{\circ}\text{C}$ . However, the voltage of smooth medicine powder shows a sudden decreasing at  $55^{\circ}\text{C}$ . Such unusual observation may be due to an easy chemical structural changing in the medicine on the particular temperature so that it needs a further study especially in the structural transformation because of physical effects of temperature and a unique current flow. However, the rough grain type of medicine is very promising due to its stability under the thermal influences.



**Figure 5:** Chemical physics responses by monitoring pH properties in the 4 types of as prepared traditional medicines as well as their physical appearance after 8 days. The pH measure was calibrated before using it with standard sample in pH meter. One found a deducted scale of 0.23.



**Figure 6:** The chemical physics properties of traditional medicines based Kian sand worm measured by time (s) versus temperature ( $^{\circ}\text{C}$ ), and voltage (V) versus  $T$  ( $^{\circ}\text{C}$ ) in its reaction with the toxic solvent, respectively.

## Conclusion

These findings note that traditional medicines fabricated using Kian sand worm have a great potential as toxic absorption based medicine besides its use as daily foods in the Tual region of Maluku province in the eastern part of Indonesia. Such remarkable accuracy was identified by the grain rough size traditional medicine with low concentration as well as the integrated multitasking response of electrical, optical and chemical properties with its lowest abs. at a moderate transparency of 0.271 a.u ( $T \sim 53.528^{\circ}\text{C}$ ),  $\text{pH} \sim 5.09$ , and stable voltage under thermal effect  $\sim 0.7$  V. In summary, such current discovery of traditional medicine based Kian sand worm opens a widely opportunity of a multitasking traditional medicine.

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