Title: Bifunctional Fluorescent Carbon Nanodts from Organic Material as Sensors for Metal Ions in Ground and Lake Water and as Nutrition Source for the Growth of Peanut and Mustard Plants

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Abstract:
Water is a basic need for all living creatures, including humans. Also, the availability of plants as a source of vegetables and fruits is essential for the survival of humans and animals. Therefore, it is necessary to detect the concentration of metal ions in water and to increase the growth of plants. The use of carbon nanodots (C-dots) is one of the methods to overcome these problems. Here, we investigate the bifunctional fluorescent C-dots from Dragon fruit peel (DFP) and galangale as sensors for metal ions in ground and lake water and as nutrition source for the growth of peanut and mustard plants. The fabrication of these C-dots uses the carbonization method. The purposes of this research are to characterize the spectra of absorption, photoluminescence, FTIR, TEM image and X-Ray diffraction patterns of the as-prepared C-dots) and to apply these C-dots as sensors for metal ions in ground and lake water and as nutrition source for the growth of peanut and mustard plants. The as-prepared C-dots emitted blue fluorescence. The characterization of the spectra of absorption, photoluminescence, FTIR, TEM image and XRD patterns confirmed the formation of C-dots from dragon fruit peel (DFP) and galangale. These C-dots have absorption and photoluminescence peaks at 279 and 430 nm, respectively. According to XRD patterns and

TEM Image, the as-produced C-dots have amorphous state. When the C-dots from DFP were synthesized with zinc (Zn^{2+}) ions, the quenching of PL intensity of C-dots took place indicating these C-dots can be used as sensor to detect Zn^{2+} ions. These C-dots have been applied to detect Zn^{2+} ions in ground and lake water with limit of detection (LOD) was evaluated as low as 3.7 and 3.2 μM, respectively. The C-dots from galangale have been also synthesized with ferric (Fe^{3+}) and magnesium (Mg^{2+}) ions with the LOD value for Fe^{3+} and Mg^{2+} ions is 2.85 and 3.25 μM, respectively. The impact of the giving C-dots from DFP to the growth of mustard plant and C-dots from galangale to the growth of peanut plant is significant where the content of chlorophyll is bigger in the plants given C-dots that that without C-dots indicating C-dots are a nutrition source for the growth of mustard and peanut plants. Overall, the C-dots from DFP and galangale can be used as sensors for Zn, Fe and Mg metals, and a nutrition source for the growth of mustard and peanut plants.

Biography:

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Zakarias Seba Ngara is currently a lecturer and associate professor in Physics Department, Faculty of Science and Engineering, Nusa Cendana University, Indonesia. He started to be a lecturer at Nusa Cendana University since 2001. He obtained his Ph.D degree in Materials Science Department, Faculty of Pure and Applied Science at Tsukuba University, Japan in 2019 where He received scholarships from Indonesian Governments (Indonesia Endowment Fund For Education). He got undergraduate and masters in physics science at Gadjah Mada University, Indonesia. At present, His area of interest in research is carbon nanodots and their application in many fields such as sensor for metal ions in real water (ground water, sea water, and lake water) and small molecules, bioimaging, nutrition source for the growth of plants. Thus, He conducts research about organic semiconductor as functional materials in various electronics devices such as solar sell, light emitting diode, and so on.

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Notes or Comments: