

Review:

Summary: This article deals with exploring a novel way to deal with getting a superior alpha-molecule strong source created on the doped diamond, a low-Z material with less corrosion and more mechanical hardness. The boron-doped diamond (BDD) substrate showed excellent exhibitions in the autoradiography and spectroscopic than stainless steel. A precipitation process in the Na₂SO₄ or NaNO₃ electrolytes under mild test conditions with a low current density mA.cm⁻² was sufficient to create a single ²⁴¹Am as well as ²³⁹Pu, ²⁴¹Am and ²⁴⁴Cm mixed radionuclides onto BDD substrates. The outcomes reveal that BDD substrates exhibit comparable performance than steel substrates with incredible consistency and high-resolution spectroscopy. Here the strength, chemical resilience and X-beam transparency of a doped diamond integrated to achieve desirable performance. Alpha-molecule spectra displaying a low full width at half most extreme (FWHM) of 12.5 keV at the vitality of 5.485 MeV (²⁴¹Am) shows the benefit of using BDD substrates.

Broad comments:

Strength: The unique application being doped diamond used in radioactive measurements.

Weakness: Article conveys a very nonchalant approach of authors regarding explaining science. First of all, BDD has three categories: Ultra nanocrystalline, nanocrystalline and microcrystalline. With each type has specific fabrication techniques. Also, boron doping levels alter the conductivity. It can be semiconductive, highly conductive depending upon the specific doping level. Diamond itself has a heterogeneous surface morphology with grain and grain boundaries, doping. Such things change the surface reactivity under any specific electrochemical deposition condition for a specifically doped sample. Authors never mentioned such specificities. Also, it is unclear what kind of boron doped diamond with specific surface chemistry they got. Authors need to mention these things in the text. Also, authors need to convey why they used boron-doped diamond for electrodeposition. Authors can consider the following articles like “Dutta, G., Siddiqui, S., Zeng, H., Carlisle, J.A. and Arumugam, P.U., 2015. The effect of electrode size and surface heterogeneity on electrochemical properties of ultrananocrystalline diamond microelectrode. *Journal of Electroanalytical Chemistry*, 756, pp.61-68.”; “Dutta, G., Tan, C., Siddiqui, S. and Arumugam, P.U., 2016. Enabling long term monitoring of dopamine using dimensionally stable ultrananocrystalline diamond microelectrodes. *Materials Research Express*, 3(9), p.094001.”; “Tan, C., Dutta, G., Yin, H., Siddiqui, S. and Arumugam, P.U., 2018. Detection of neurochemicals with enhanced sensitivity and selectivity via hybrid multiwall carbon nanotube-ultrananocrystalline diamond microelectrodes. *Sensors and Actuators B: Chemical*, 258, pp.193- 203.” for a better explanation regarding boron-doped diamond surface. They need to mention the doped diamond growth conditions specifically, or they can cite the specific journal from they have adopted the fabrication of doped diamond.

Also, an ambiguity regarding current densities found that sometimes they are 8.0 mA.cm⁻², 3.3 mA.cm⁻², 5.0 mA.cm⁻² simultaneously changing the pH also. Authors should clearly explain to readers about selecting that particular current density and pH depending upon the diamond surface. Not sure about the profile they got using the mixture of radionuclides.

Consider rewriting the conclusion in a more better way.

Specific comments:

Line 14: It appears that **high performance** is missing a hyphen. Consider adding the hyphen(s).

Line 21 and 24: Consider adding a comma before and. Authors have missed adding a comma before and in the whole article. Please change it.

Line 23: Replace goo with excellent — overuse of “good” word.

Line 25: The noun phrase **diamond** seems to be missing a determiner before it. Consider adding an article.

Line 28: It should be Keywords.

Line 40: “a very important” can be written as “a significant feature.

Line 53: Should be “the cathodic.” It should be “reacts.”

Line 58: “very important.” - The intensifier **very** modifies the weak adjective **important**. Consider replacing the phrase with a strong adjective in order to sharpen the writing. Like significant can be used.

Line 60: Should be “, e.g.”

Line 63: It appears that **High resolution** is missing a hyphen. Change it in text wherever is necessary. Consider adding the hyphen(s). Also, consider removing a before FWHM.

Line 66: Consider adding a comma before and. Remove extra commas after “etc.”

Line 69: “The subordinate phrase **To alleviate these issues** does not appear to be modifying the subject **some works**. Rewrite the sentence to avoid a dangling modifier.”

Line 73: Should be “resulted from” not “resulted that”

Line 77 to 80: Sentence unnecessarily complexed by adding and. Try to split up in simple sentences. It appears that missing a comma after the introductory phrase **Further**. Consider adding a comma.

Line 83: It appears that the modifiers in the noun phrase **synthetic thin layers** are in the wrong order. Consider changing the word order to a thin synthetic layer.

Line 84: Either “a or the.” The word **hereby** may be considered archaic or unnecessary legal jargon by readers. Consider changing the wording to now.

Line 89: Should be “the diamond.”

Line 94: It appears that **Boron Doped** is missing a hyphen. Consider adding the hyphen(s). Change it in the title too.

Line 108: The plural verb **were** did not appear to agree with the singular subject **Doping**. Consider changing the verb form for subject-verb agreement. Like, write was.

Line 120: The phrase **Prior to** sounding wordy. Consider changing the wording to Before.

Line 133: The word **high** does not seem to fit this context. Consider replacing it with a different one like highly.

Line 138: “to obtain” should be “obtaining.”

Line 139: The indefinite article, **a**, may be redundant when used with the uncountable noun **radioactivity** in the sentence. Consider removing it.

Line 149: Should be “the geometrical.”

Line 158: Should be “the whole.”

Line 160: Should be “a result.” Consider changing it in the following sentences.

Line 164: The plural verb **have** does not appear to agree with the singular subject **deposited BDD substrate**. Consider changing the verb form for subject-verb agreement to has. The phrase **with respect to** sounds wordy consider changing the wording only “to/concerning.” Follow the same in the following sentences.

Line 165: It appears that the verb **produce** should be in the *to-infinitive* form. Consider adding the word “to.”

Line 167: Add a comma after case.

Line 170: It appears that the verb **generates** incorrectly used with the helping verb **do**. Consider changing it to the base form.

Line 172: Can authors add some color scale in the profile image of Figure 2 — A and B to differentiate between the yellow, red and green. Do the similar for all the following graphs.

Line 182: Should be “has grown.”

Line 190: Should be “were grown.”

Line 204: Should be “was estimated.”

Line 207: The “are” should be replaced with is. Consider adding with before standard.

Line 208: It appears that **clearly** may be unnecessary in this sentence. Consider removing it.

Follow the same for the following sentences.

Line 211: Should be “display.”

Line 226: The alpha-particle.

Line 231: The cathode.

Line 256: It appears that **high quality** is missing a hyphen. Consider adding the hyphen(s).

Line 257: The word **Especially** is often overused. Consider using a more specific synonym to improve the sharpness of the writing like add Notably. Replace it with its.

Line 258: Should be “the nuclear.”