

Accepted Manuscript

Feasibility of using non-thermal microwave plasma for nuclear waste management: A detailed study backed by plasma spectroscopy

R. Kar, A. Bute, N. Chand, Romesh Chandra, D.S. Patil, P. Jagasia, P.S. Dhami, S.Sinha



PII: S2352-1864(18)30185-8
DOI: <https://doi.org/10.1016/j.eti.2018.09.005>
Reference: ETI 274

To appear in: *Environmental Technology & Innovation*

Received date: 13 April 2018
Revised date: 17 September 2018
Accepted date: 19 September 2018

Please cite this article as: Kar R., et al., Feasibility of using non-thermal microwave plasma for nuclear waste management: A detailed study backed by plasma spectroscopy. *Environmental Technology & Innovation* (2018), <https://doi.org/10.1016/j.eti.2018.09.005>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Feasibility of Using Non-thermal Microwave Plasma for Nuclear Waste Management: A Detailed Study Backed by Plasma Spectroscopy

R. Kar^{1*}, A. Bute¹, N. Chand¹, Romesh Chandra², D.S. Patil³, P. Jagasia³, P.S.Dhami⁴, S.Sinha¹

¹Laser & Plasma Surface Processing Section, Bhabha Atomic Research Centre, Mumbai-400085

² Accelerators and Pulsed Power Division, Bhabha Atomic Research Centre, Mumbai-400085

³Metallurgical Engineering and Materials Science, IIT Bombay, Mumbai-400076

⁴Fuel Reprocessing Division, Bhabha Atomic Research Centre, Mumbai-400085

*Corresponding author: rajibkar.ph@gmail.com, phone: 91-22-2559-5001

Abstract: Plasma is probably the most underused tool applied for nuclear waste management. To study the feasibility of putting this technology in practice, a non-thermal microwave based atmospheric pressure plasma jet (ATPPJ) had been developed. The device was characterized by spectroscopic technique prior to its actual deployment inside glove box to narrow down its operational regime and also tested on Ta, a known surrogate of Pu which showed its efficacy in etching. The device was then used for removal of Pu based synthetic radioactive wastes inside radioactive glove box thereafter, optimization studies were conducted to maximize decontamination efficiency and it was seen that oxygen in plasma plays a significant role. The same device was later scaled up to a multi-electrode model and used for similar radioactive waste removal. Both these devices under optimized condition could remove ~ 92% radioactive wastes and the scaled up model reduced duration by 50%.

Download English Version:

<https://daneshyari.com/en/article/11033363>

Download Persian Version:

<https://daneshyari.com/article/11033363>

[Daneshyari.com](https://daneshyari.com)