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Development of a Cs-Free Negative Hydrogen Ion Source System Using Multi-Pulsed Plasma Sources: Prospect and Challenges

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KAERI has recently developed a novel hydrogen ion source system for fusion and particle accelerator applications. The main feature of this system is the use of source pulsing based on the volume production mechanism to improve the efficiency. The pulsing is a method of modulating plasma power and so the electron energy, providing a favorable condition (the after-glow) for negative ion generation. Its only drawback is, however, that it is unable to continuously supply the negative ions to an extraction system because inherently transient. To remedy the drawback, we have introduced a multi-pulsing method. The system operates with alternating pulsing sequences corresponding to two plasma sources, thereby generates the after-glow states in an alternating manner. This enables the system to continuously supply the negative ions in terms of the whole. In this presentation, the concept, proof-of-concept results, and also prospect and challenges of the system will be presented and discussed.

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