Combined system of energy-saving H_2O-electrolysis and eco-friendly battery: simultaneous production of H_2 gas and in situ treatment of eutrophication

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Advantage

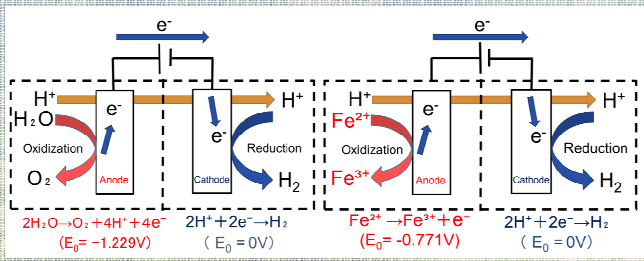
① The success of energy saved and eco-friendly Hydrogen production

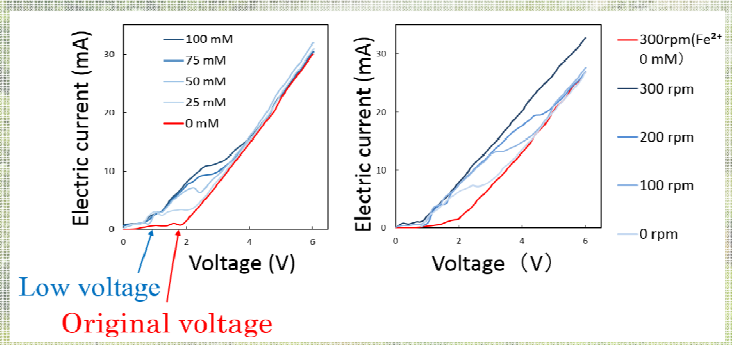
② The discovery of the efficient reduction of Fe^{3+} with the waste tea leaves

③The accomplishment of 100% recovery of phosphate and simultaneous removal of Nitrate

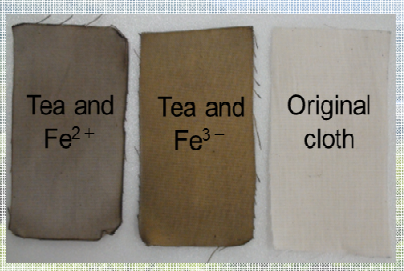
④The development of the device which works with no power supply

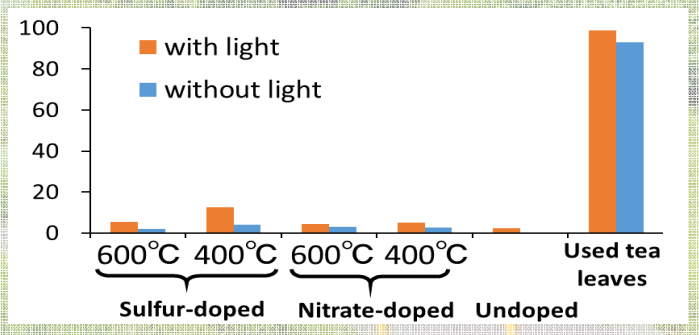
Low-voltage electrolysis



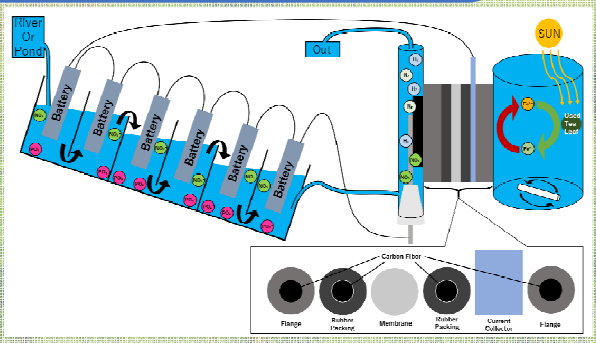


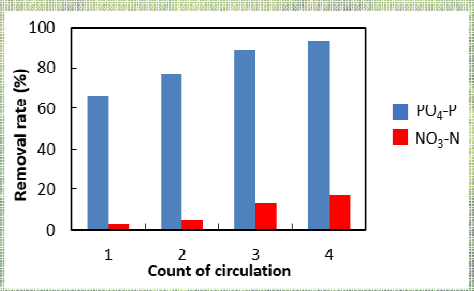
Reduction by Used Tea Leaves





Removal of PO_4^{3-} and NO_3^-





PO_4^{3-} is recovered at 100%

Discussion

Affordable — Low cost

Available — Easy to get

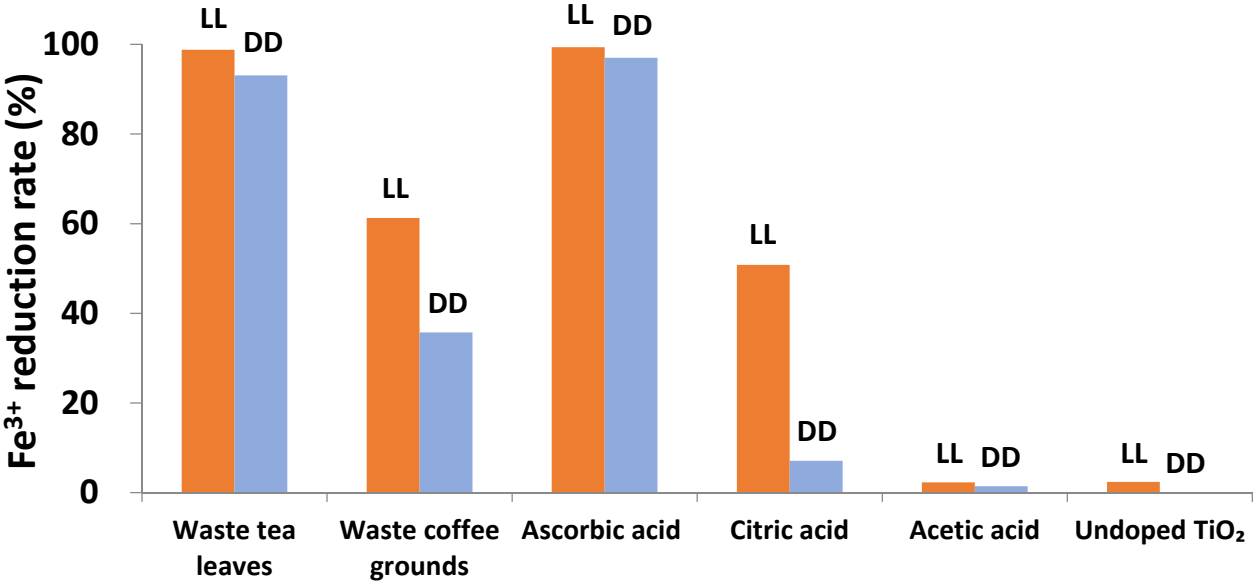
Accessible — Anyone can use

In developing country

- The access for safe drinking water
- The agriculture utilizing phosphorus
- Clean and cheap energy production

In developed country

- The purification of eutrophicated water
- Energy saved H_2 production



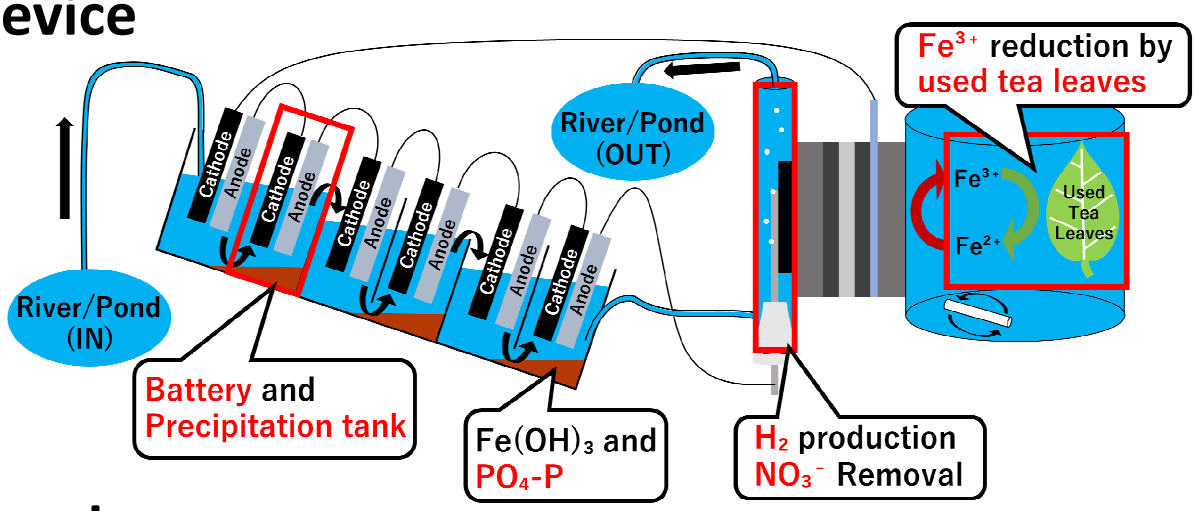
Nitrification

$NH_4^+ \rightarrow NO_2^- \rightarrow NO_3^-$

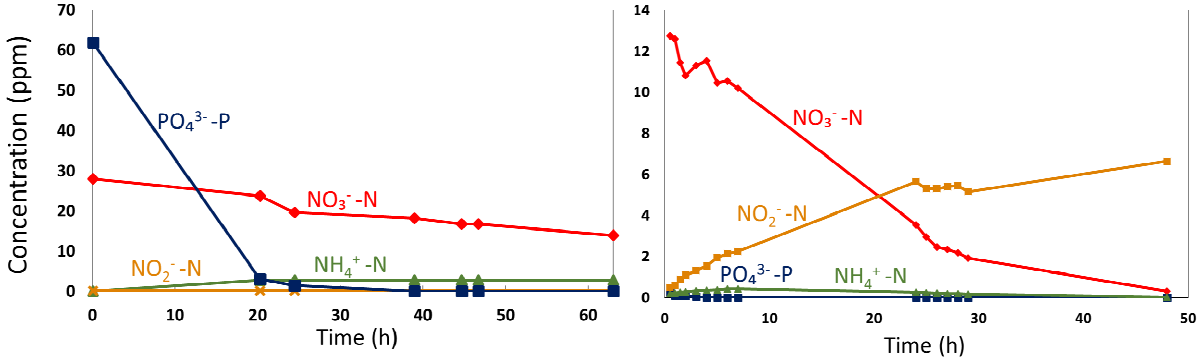
Denitrification

$NO_3^- \rightarrow NO_2^- \rightarrow NO \rightarrow N_2O \rightarrow N_2$

Device



Result



Test water

Purification Plant