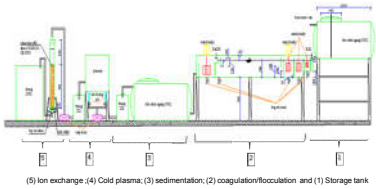
3rd Progress of Joint Research Activities

Research No.: ㉛ E-6 **ODA Loan Joint Research**		Date:16/Oct/2020
1	**General Title**	**To study possible techniques to treat soil, water and air pollution in the specific context of the Vietnamese Mekong Delta**
2	**Core Members**	**CTU**: Pham Van Toan (Project Leader), Doan Van Hong Thien, Dang Huynh Giao, Nguyen Huu Chiem, Van Pham Dan Thuy, Kim Lavane, Bui Thi Minh Dieu, Quach Ngoc Thinh, Ngo Thuy Diem Trang **Japanese Universities and Companies:** Koyama (Kagoshima University), Tarao (TUAT), Nishimura(Tokyo), Nishikawa and Miyata (KIT)
3	**Duration**	April 2017 – (3 years)
4	**Main Objectives**	The aims of the program are to establish techniques to mitigate environmental pollution from agricultural development, aquaculture, economy and climate change.
5	**Focal Points**	❖ Experiments on removing target pesticides/antibiotics from wastewater by the pilot-scale model of wastewater treatment system.



(5) Ion exchange ;(4) Cold plasma; (3) sedimentation; (2) coagulation/flocculation and (1) Storage tank

Fig. 1 Schematic of pilot- scale model of wastewater treatment system

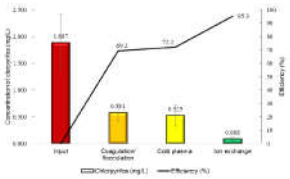


Fig. 2 Removal efficiency of chlorpyrifos from wastewater

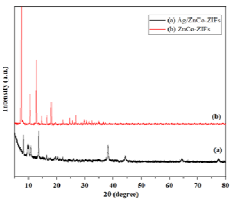


Fig. 3 PXRD of (a) Ag/ZnCo-ZIFs, (b) ZnCo-ZIFs-1:8

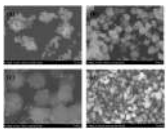


Fig. 4 SEM micrographs of Ag/ZnCo-ZIFs at the different magnification ratios (a) x5000, (b) x10000, (c) x30000; (d) ZnCo-ZIFs

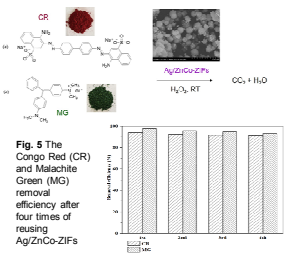


Fig. 5 The Congo Red (CR) and Malachite Green (MG) removal efficiency after four times of reusing Ag/ZnCo-ZIFs

❖ Synthesis Co-ZIFs and experiments on removing organic pollutant from water through catalytic oxidation process of another kind of Co-ZIFs.

❖ Development processes for manufacturing nanocellulose from paper and investigation of the conditions for producing cellulose membrane.

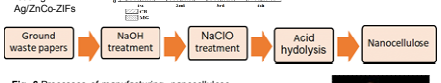


Fig. 6 Processes of manufacturing nanocellulose

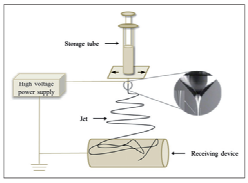


Fig. 7 Production processes of cellulose membrane

❖ Experiments on developing the low cost system for domestic water treatment.

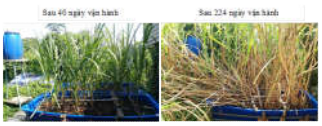


Fig. 8 Constructed wetland systems

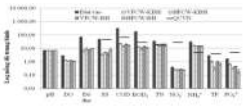


Fig. 9 Removal efficiencies of constructed wetlands using charcoal residues

❖ Experiments on developing a prototype of MFC electricity harvesting system.

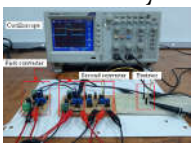


Fig. 10 Configuration of electricity harvesting system

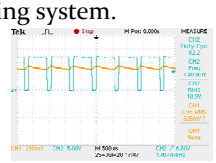


Fig. 11 MFC voltage (orange curve) and MOSFET gating signal (blue curve)

❖ Experiments on exploring the microbial activities associated with the pollutant reduction. Inactivation of *E. coli* enhanced by anaerobic microbial iron reduction.

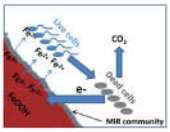


Fig. 12 Effects of iron reduction on inactivation of *E.coli*

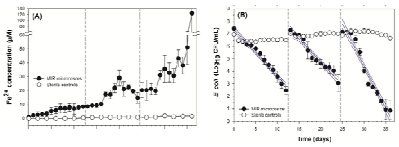


Fig. 13 Ferruos ion production (A) and inactivation rate of E. coli at three stages of anaerobic incubation

❖ Experiments on screening plant species having ability to remove salts and selection of salt-resistant plants species.

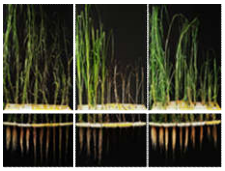


Fig. 14 Salt tolerance capacity of Para grass (*Brachiaria mutica*), Paspalum grass (*Paspalum atratum*) and Setaria grass (*Setaria sphacelata*)

Fig. 15 Field experiment on the plant species having ability to remove salts

6	Perspectives	Developed technologies have valueable scientific contribution and potential applicability in the context of the Mekong Delta in Viet Nam.