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| **MEDIA STORY BANK: PROPOSALS TO RECEIVE FUNDING FROM THE GSK-SINGAPORE GREEN AND SUSTAINABLE MANUFACTURING PARTNERSHIP** | | |
| **Projects** | **Novel approach** | **Story opportunity** |
| **GREEN ENGINEERING** | | |
| **DEVELOPMENT of a PALLADIUM-COPPER CONTINUOUS FLOW REACTOR as a COMMON HETEROGENEOUS CATALYST PLATFORM**    Principal investigator: Dr. Ken Lee  Singapore Polytechnic (SP)  Email: [kenlee@sp.edu.sg](mailto:kenlee@sp.edu.sg)  Year of Award: 2013 | Under the broad scope of continuous flow chemistry, tubular reactor technology is particularly advantageous as it is highly effective towards large-scale manufacturing with the bigger channel diameters (meso-flow). It offers excellent mixing, expands chemical space, improves the heat transfer and the atom economy through better reaction control. Recent trends in continuous flow have shown the use of metal reactors as a catalytic source to promote green chemistry. The copper (Cu) tubular reactor has been shown to be effective in catalyzing the Click Chemistry reactions and several other synthetic transformations in good yields. There were reports on the development of a palladium-copper (Pd-Cu) alloy on the inner surface of tubular reactor where Sonogashira C-C coupling reactions were carried out under elevated temperature and pressure, using water as reaction solvent.  Our research focuses on meso-flow tubular reactors, which can provide more direct access towards continuous manufacturing on a larger scale. Recently, we submitted a paper describing a heterogeneous Pd- Cu tubular flow reactor, where a Pd coated tubular reactor was placed in line with a Cu tubing, providing facile access to a wide range of Sonogashira C-C coupling products from moderate to good yields under ambient conditions. Under this quasi-homogeneous mechanism, we managed to increase the appeal of this method where: (i) promoters like phosphines are not needed; (ii) traces of leached Pd and Cu can be removed effectively with metal scavenging resins at the backend of the flow setup; (iii) the performance can be maintained after several catalytic cycles. | There are existing reports and publications that show the advantages of continuous manufacturing over traditional batch processes. The successful development of modular flow reactor as a common heterogeneous platform for Pd-catalyzed reactions can potentially enhance existing methods in several ways. The first is that it accelerates synthetically useful Pd-catalyzed reactions in pharmaceutical and fine chemical industry. Furthermore, it also offers a greener approach by effectively removing traces of leached metals. Lastly, it does not increase the footprint of existing flow systems - scaling up of flow systems require "numbering up" the tubular reactors and do not require larger capacity. |