

## Environmental Research, Technology Demonstration and Conference Project

<b>ECF Project:</b>	ECF 2021-125
<b>Project Title:</b>	Structure-conformal and mechanically robust batteries for miniaturized mobile machineries
<b>Principal Investigator:</b>	Dr Xu Lizhi, Department of Mechanical Engineering, The University of Hong Kong
<b>Total Approved Grant:</b>	\$497,520
<b>Duration:</b>	1/1/2023 to 31/12/2024
<b>Project Status/Remarks:</b>	On-going
<b>Project Scope:</b>	<p>Replacement of internal combustion engines with electrochemical power sources represents a promising approach to the reduction of air pollution in urban environment. However, the applicability of commercial batteries is limited by their large sizes, safety concerns, susceptibility to mechanical damages and other drawbacks. Here we aim to address these issues by developing self-reinforced solid-state rechargeable batteries that can be integrated with the intrinsic structures of machineries. A key to this proposed technology is a type of nanofiber composites we recently developed, which exhibits a unique combination of high ionic conductivity, mechanical strength, toughness, and thermal stability. These nanofiber composites could serve as both solid-state electrolytes and separators in rechargeable batteries that safely operate in harsh mechanical environment. Furthermore, with a selection of electrode materials, these batteries can be manufactured into custom 3D geometries and merge into the load-bearing structures of miniaturized mobile machineries. We will develop rechargeable zinc-air battery systems based on our technologies and explore further possibilities with other battery chemistries. Successful demonstration of this project could offer a clean power solution for miniaturized mobile machineries, aligning with The Clean Air Plan for Hong Kong 2035.</p>
<b>Summary of the Findings/Outcomes:</b>	To be available upon completion of the project