

Innovation systems of emerging rechargeable battery technologies

Background

Lithium-ion batteries (LIBs) have emerged as the dominant technology for rechargeable batteries. However, considerable research efforts are put into developing new, emerging battery technologies, such as lithium-sulfur batteries, sodium-ion batteries, all solid-state batteries, lithium-air batteries, aluminium batteries, calcium batteries, organic batteries, etc. Some of these, like lithium-sulfur batteries, have begun to be produced at pilot scale and are approaching commercialisation, whereas most of them have only been produced at laboratory scale yet. Often, the emerging battery technologies are advertised as having the potential to reach more promising technical properties than existing LIBs, for example in terms of specific energy (Wh/kg), energy density (Wh/litre) and other important battery properties. They also generally have small groups of advocating actors around them, often consisting of research groups and research institutes involved in their development, as well as some smaller start-up companies for the technologies that have begun to leave the lab bench.

Project

The project is about analysing the innovation system of emerging rechargeable battery technologies – or a selection of specific emerging rechargeable battery technologies. While they might sometimes have promising technical properties, LIBs have now reached a dominant position globally. What would it take to establish a competing, emerging battery technology on the market? What are the prospects of emerging rechargeable battery technologies? How likely is it that battery roadmaps showing non-LIBs (e.g. lithium-sulfur batteries) on the market in 2030 will turn out to be right? Are there any major hindlers, lock-in effects or opposing regime actors? Are there any promising niche applications for emerging battery technologies, where they can thrive and become developed? Who are the main players in terms of patenting new battery technologies? The analyses will take as points of departure the technological innovation system (TIS) framework, the multi-level perspective (MLP) and/or patent analysis.

Further reading and literature

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Geels, F. W. 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy* 31(8): 1257-1274.

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