Popular science summary of the PhD thesis

PhD student	Markus Asikainen
Title of the PhD thesis	Improving robustness and performance of Li-ion systems for hearing aids.
PhD school/Department	DTU Construct

Science summary

This Industrial PhD project was conducted under the Celcorr research group at DTU and WS Audiology hearing aid manufacturer, with support from Innovation Fund Denmark. The goal was to improve our understanding of factors that affect the reliability of hearing aids powered by Li-ion batteries and to enhance the performance of these devices. Hearing aids (HAs) are small, low-power electronic devices used globally to improve the quality of life of people with hearing problems. The hearing aid industry is shifting from zinc-air batteries to Li-ion batteries, which are common in most portable electronics used every day, like mobile phones. Li-ion batteries can be recharged, which benefits the hearing aid user and creates a better user experience. Corrosion is causing failures in our ships, cars, buildings, and all kinds of metal surfaces. Corrosion also occurs inside of our everyday electronic devices. Corrosion reliability in electronics is crucial, especially in hearing aids, because they face challenging environments, such as contact with body fluids like human sweat, high humidity, and temperature changes. Therefore, this PhD project aims to improve the robustness and performance of hearing aids against harsh user environments. This is done through the following four projects, including root cause field failure analysis, evaluation of finding better conformal coating to protect the electronics, trying to understand why the charging contacts corrode, and finally, building an understanding of why some of the Li-ion batteries have failed inside the hearing aid.

Overall, the PhD project provided valuable suggestions for improving the robustness and performance of Li-ion-powered hearing aids. Furthermore, it developed knowledge of various topics, such as failure mechanisms and modes and mitigation strategies, which can help build more durable electronic devices in the future.

Popular science summary of the PhD thesis

PhD student Markus Asikainen

Please email the summary to the PhD coordinator at the department