able to pressurise battery cells up to a certain degree and then charge and discharge them there. This is important, for example, when it comes to whether it is possible to continue driving after an accident or other mechanical impact.

For Eva Heider, however, measurement accuracy is essential: “Our laboratory, the Battery Safety Centre Graz, and our test benches are truly unique. They are designed in such a way that we can use the high-precision measurement results to run simulation models.” And Jörg Moser adds: “It has to be clear whether the effects are due to the load from the test itself and not because the test bench itself is buckling, for example. This is not such an easy task since the pressure plate alone weighs 1.6 tonnes and can exert up to 100 tonnes of force. However, we have developed a sophisticated measurement concept and can achieve so much in the area of design that the effects from the test bench are negligible,” he explains. At some point in the future, electrochemical impedance analyses (EIS measurements for short) will be able to be carried out in the new test bench. The aim is to find electrical parameters that enable simple, non-invasive statements to be made about the state of health of the battery cell.

“And, of course, it is always important for us that the test bench is thermally safe,” explains Moser cryptically. And he adds: “Because we also test our batteries fully charged until they fail.”

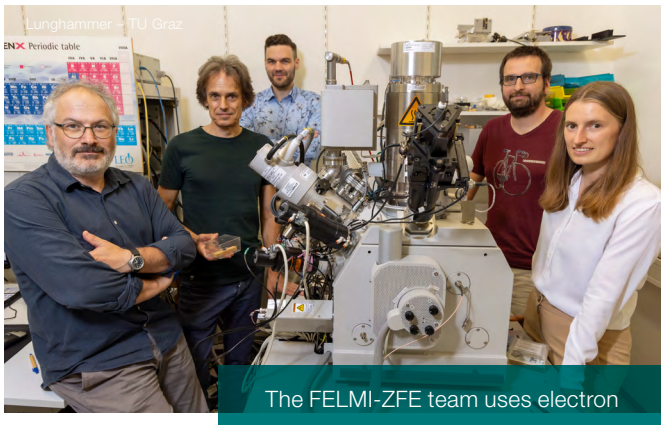
TESTS TO IMPROVE VEHICLE SAFETY

Corina Klug at the Institute of Vehicle Safety also deals with road safety. The focus of the research group is on the people who are in the vehicle as well as on those who are on the road outside the vehicles and their behaviour shortly before and during an accident. In the institute’s Crash Lab, her team carries out various tests and experiments on different scenarios in order to further improve simulations. One current topic, for example, is how differently female and male bodies are protected in vehicles, as Klug explains: “In previous studies, women’s bodies were often defined as smaller men’s bodies – which is not true at all anatomically. However, too little consideration is still being given to these physical differences and the resulting changes to the occupant protection systems in the vehicle.”

A special test rig for volunteer tests is being used to investigate how the seat belt interacts with different body shapes during normal braking manoeuvres and in different seating positions. Gregor Gstrein is responsible for the experimental area in the research group and explains that the experiments are subject to strict safety measures to ensure that nobody is injured. Desiree Kofler, who has already conducted several test series here, reports that “the test subjects can distract themselves from the tests with small games in a virtual world and have a lot of fun in the process.” “It’s almost as much fun as riding a roller coaster,” says Corina Klug, who has also sat on the sledge a few times herself. Christoph Leo heads the FemTech FFG project FairOSA, in which a large series of tests with more than 60 test subjects is planned. “The data obtained from the tests can be used to further improve virtual human models and generate a better understanding of how to achieve optimal interaction between the seatbelt and different body shapes. There are now many possibilities thanks to camera systems in the vehicle and by specifically influencing the belt characteristics using belt tensioners and belt force limiters, and we work on finding the optimum solution to increase overall safety for everyone.”

ELECTRON MICROSCOPES

“Electron microscopy is an key research tool," says Gerald Kothleitner from the Institute of Electron Microscopy and Nanoanalysis at TU Graz. “It provides meaningful images of the structure of a material, which can be used in combination with spectroscopic measurement methods for extensive analyses.” Electron microscopes can be used to recognise atomic structures in the object under investigation, smallest quantities



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The FELMI-ZFE team uses electron microscopes to look deep into the material structure.