

From Automotive Waste to New Industrial Materials

Pahlevani, F.¹, Kumar, R.², Gorjizadeh, N.², Hossain, R.², Cholake, S.², Privat, K.³ and Sahajwalla, V.²

¹ Centre for Sustainable Materials Research and Technology (SMaRT), School of Materials Science and Engineering, UNSW Sydney, Australia, ² Centre for Sustainable Materials Research and Technology (SMaRT), School of Materials Science and Engineering, UNSW Sydney, Australia, ³ Electron Microscope Unit, Mark Wainwright Analytical Centre, UNSW Sydney, Australia

This project takes an innovative approach to the challenges of waste management and the need for new industrial materials. Complex industrial waste is not suited to conventional sorting and recycling methods due to its heterogeneous nature; consequently, much of it is ultimately disposed of in landfill. Steels and steel coatings with high abrasion and corrosion resistance are highly valued for industrial applications, but are both expensive and difficult to produce. Here we use complex automotive waste as an input stream in the modification of steel surfaces. Using a precisely controlled high-temperature procedure, a chemically-bonded ceramic surface is formed on normal carbon steel that increases the corrosion and abrasion resistance of the steel. The procedure is economical and can be modified to customise the surface to suit the intended application of the material. This novel methodology addresses industrial demands for durable steel products while also reducing the amount of industrial waste that ends up in landfill.

Acknowledgements: This research was supported under the Australian Research Council's Industrial Transformation Research Hub funding scheme (project IH130200025) and was undertaken with the assistance of resources from the National Computational Infrastructure (NCI), which is supported by the Australian Government. The authors acknowledge the facilities, and the scientific and technical assistance of the AMMRF node at the UNSW Sydney EMU.