

Assessing the bioavailability of metal ions accumulated by DRAM® filters

“Through the BIV, the network has allowed us to better evaluate the readiness level of our collaborator’s developing technology. It may be possible to scale up this technology for commercial metal recovery.” Epona Technologies Ltd



THE UNIVERSITY
of EDINBURGH

Louise Horsfall, University of Edinburgh
Leigh Cassidy, Epona Technologies Ltd



A DRAM filter

OUTCOMES: This project assessed the potential to recover Cu(II) from DRAM® media filters and convert it to metallic copper nanoparticles using *M.psychrotolerans*. Using a CuSO₄ solution, Cu(II) was accumulated on DRAM filters. Approximately 20% of this bound Cu(II) could be made available for biotransformation into metallic copper nanoparticles. These particles were visualised and positively identified by electron microscopy. Thus *M.psychrotolerans* can form nanoparticles from Cu(II) accumulated on DRAM® filters. Approximately 12% of Cu(II) was reduced by *M.psychrotolerans* to metallic copper nanoparticles. Although the proof of principle study was successful with model solutions and controlled copper solutions, the industrially used DRAM® media — with its unknown contaminants — is currently beyond our methods of nanoparticle isolation and analysis, so further work is needed to identify nanoparticles from this source.

INITIAL AIMS: There is increasing concern over environmental copper levels, their toxicity and the adverse effects on humans and wildlife. Epona Technologies Ltd has developed DRAM® (device for the remediation and attenuation of multiple pollutants) filters, which can accumulate polluting copper ions from industry and agriculture. We would like to determine whether the copper ions accumulated by DRAM® filters can be transformed into copper nanoparticles by *Morganella* sp., so offering a way to recycle copper.

- *M.psychrotolerans* can form copper nanoparticles from Cu(II) accumulated on DRAM® filters
- Paper: Cueva & Horsfall (2017) *Microb Biotechnol.* 10: 1212-1215