

Junior Fellowship for Dr. Anita Etale: Nanotechnology for the provision of safe water in mining communities

Initiative: Wissen für morgen – Kooperative Forschungsvorhaben im subsaharischen Afrika (beendet)

Bewilligung: 14.02.2017

Laufzeit: 3 Jahre

The consumption of acid mine drainage (AMD)-contaminated water by residents of informal settlements around mining districts such as Carletonville in Gauteng is common in South Africa. Very often without access to municipal water services, communities use such water for potable purposes despite the associated health risks. This threatens their livelihoods through ill health and exacerbates poverty as meagre resources are expended in healthcare. The objectives of this project are to (i) understand the acceptance criteria for nanotechnology-enabled water treatment in communities with limited access to safe drinking water, (ii) synthesise and optimise graphene oxide-based nanocomposite membranes for the removal of Hg and U(VI) from AMDcontaminated water and (iii) develop a point-of-use membrane filter to treat water to WHO standards and delineate the effect of access to safe water on livelihood outcomes in mining communities. Consumer assessment activities involving risk description by expert mental models, openended interviews and confirmatory surveys will be carried out to assess access to water and attitudes to nano-enabled water treatment. Water filters using polyethersulphone (PES) membranes modified with graphene oxide (GO) or its cysteine-coated derivative will be developed for Hg and U removal. GO will be synthesized by a modified Hummers method and incorporated into PES membranes by phase inversion. At the end of this project, the Carletonville community will have an increased awareness about Hg and U(VI) health risks and water contamination in general and greater access to safe water through the use of filters. This study will also provide much needed empirical evidence for "need" as a driver of acceptance for nanotechnology enabled innovations, and the applicability of nanocomposite membranes in filters.

Projektbeteiligte

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