

UWS Innovation

NanoRatchet

Inventors Dr Scott Willis, Prof William S. Price, Assoc. Prof Gary Dennis and Dr Gang Zheng have developed an original design for a new separation technology (the NanoRatchet). The NanoRatchet can be constructed from nano-materials and upwards, to achieve continuous flow separations at the molecular level through to (macroscopic) particle separations.

The ability to separate molecules, ions and particles is at the heart of many industries from mining to water analysis & treatment organisations. This is typically performed using complex and expensive batch separation methods that can be difficult to implement outside of the laboratory.

Continuous flow separation (e.g. ratchet separation) is one in which the separation occurs at an angle to the flow direction allowing continuous addition, collection, analysis and monitoring and is well suited to 'in-line' processes.

Nano-materials may be used to achieve the new ratchet mechanism of the NanoRatchet, removing the limitations of lithography and similar methods (and the expense associated with using these methods of manufacture). The NanoRatchet enables continuous flow type separations of small molecules / ions / particles and has potential for applications such as speciation and ion analysis or quality control monitoring through to (macroscopic) particle separations.

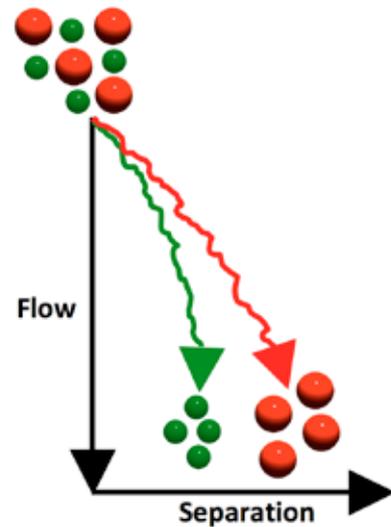
Status: PCT filed

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Schematic of the continuous flow separation of a mixture of two particles in the NanoRatchet.

Benefits:

- » Comparatively inexpensive.
- » Potentially useful for fast 'in-line' applications.
- » Overcomes the expense and limitations associated with lithography techniques.
- » Enables a ratchet type separation device to be utilised for continuous flow type separations of small molecules / ions / particles.
- » Alternative to high performance chromatography separations which can be time intensive, require expensive equipment and are generally difficult to implement.
- » Several different nano-structures are available allowing for variation of the ratchet mechanism and other types of NanoRatchets.
- » Used for an 'in-line' monitoring system coupled to quick and cheap detection methods like voltammetry.
- » Useful for a pre-concentrator or component separator (for simplifying and removing complications for detection, such as interference).
- » Scaled-up versions (i.e. macroscopic scale) are also possible for separating large particles/objects.

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