



# Oil and Water Dispersion Technology Licensing Opportunity

## Technology Brief

Professor Richard Pashley has discovered that the formation of stable emulsions of hydrophobic substances in aqueous medium can be achieved by the process of degassing. The removal of dissolved gas, for example in oil and water, results in a reduction of hydrophobic interactions and subsequently, stabilizes oil droplet dispersions. While laboratory scale degassing is predominantly batch processed and time consuming, Professor Pashley has also developed a membrane method for degassing hydrophobic liquids and emulsions that can be utilized at a commercial scale.

Generally, colloidal emulsions of hydrophobic substances can only be achieved through the addition of surfactants, polymers or surface-treated particles to prevent coagulation, coalescence or phase separation from the aqueous dispersion medium. Professor Pashley's processes eliminate the need for the use of such dispersion stabilizers. Specifically, trials were conducted to assess the robustness of the surfactant-free emulsions using hydrophobic oils (dodecane & squalane) as well as surfactant-free polytetrafluoroethylene (Teflon) powder. His research successfully demonstrated that degassing can enhance the dispersion of strong hydrophobic substances without the need of dispersion or emulsifying agents. In air-tight containers, these dispersions can remain stable indefinitely.

## Field of Use

The technology has widespread applications for the following industries

- Pharmaceutical
- Cosmetic
- Manufacturing
- Industrial applications, ie paint, Teflon polymers, adhesives, synthetic rubbers and thermoplastics

## Competitive Advantages

The use of degassed dispersion media can potentially remove the need for hazardous surfactants and emulsifying agents. These have significant benefits such as:

- Lowering production costs
- Mitigation/ reduction of production and environmental risks
- Reduced consumer and occupational health and safety risks
- Facilitating wider global distribution due to increased consumer confidence
- Flexible application to many production and manufacturing processes

## Further Developments

Additional research with Teflon has demonstrated that degassed Teflon dispersions in water resulted in comparable coating to that of Teflon dispersions in surfactant stabilizers. More information on the optimized conditions and trial methods is available upon request.

## IP Status

The novel membrane-based degassing method is the subject of a PCT application WO2006/066359, entitled "Methods for degassing hydrophobic liquids and emulsions formed therefrom" with Murdoch University as the sole assignee. The current patent claims a method for degassing a hydrophobic liquid by passing the liquid along one side of a porous hydrophobic membrane, and simultaneously passing a degassed aqueous liquid along the other side of the membrane for gaseous transfer.

The patent portfolio also includes patent applications for the preparation of emulsions in pharmaceutical applications and the dispersion of Natural Oils and/ or synthetic essential oils in water.

In addition the process of creating emulsions and dispersions by degassing is the subject of a US patent application "Process for the production of emulsions and dispersions", filed on November 4, 2004, claiming a priority US filing date of November 5, 2003 (US App. No. 10/703,094). The listed inventor is Richard M. Pashley and the assignees are The Regents of the University of California and the Australian National University (ANU). Murdoch University has an agreement for exclusive rights to commercialise the IP.

The US patent application claims processes for the production of colloidal suspensions resulting from the combination of an aqueous substance with another substance that is normally immiscible with the aqueous substance to form a mixture as a result of degassing. The methods further detail the formation of colloidal suspensions for emulsions and particulate dispersions that are stable for periods from an hour to several weeks.

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