# Constant $^{1}H$ and $^{13}C$ signal enhancement in NMR using hollow fiber membranes and parahydrogen.

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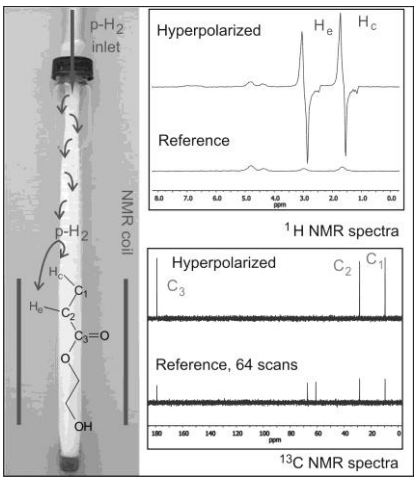


Enhancing the sensitivity of nuclear magnetic resonance via Parahydrogen Induced Polarization (PHIP) is of high interest for spectroscopic investigations. PHIP is a chemical method, which makes use of the correlation between nuclear spins in parahydrogen to create hyperpolarized molecules[1]. In order to achieve the highest possible sensitivity gain it is of great importance to optimize the reaction and measurement conditions of the parahydrogenation technique.

We optimized the conversion rate and established optimal NMR measurement conditions by utilizing hollow fiber membranes[2] for continuous parahydrogen delivery while performing PASADENA experiments. This new way of dissolving parahydrogen more efficiently into water without the occurrence of foam and bubbles offers the opportunity to implement continuous flow measurements under pressure, leading to higher conversion rates and higher polarization levels. Furthermore, this careful control of the parahydrogenation reaction generates a constant hyperpolarization of $^{1}H$ and $^{13}C$ over a certain time (several minutes) which enables us to perform 2D NMR experiments with very high sensitivity.

References:
1. Natterer J. and Bargon J., Prog. Nucl. Magn. Reson. Spectrosc., 31, 293 – 315 (1997)
2. Baumer D., Brunner E., Blümler P., Zänker P.P. and H.W. Spiess, Angew. Chem. Int. Ed., 45, 7282–7284 (2006)