Reaction monitoring using multiple NMR receivers

A. Moreno[1]

[1]Bruker BioSpin AG, Industriestrasse 26, 8117 Fällanden, Switzerland - aitor.moreno@bruker.com

Conventional NMR spectrometer require three main components: the superconducting magnet generating the strong magnetic field, the sensor (or probe) acting as send and receive antenna and the spectrometer console hosting the electronics required to perform the NMR experiment. The recently introduced AVANCE NEO console electronics is based on a fully modular and highly integrated RF transmit and receive (so-called transceiver) concept. Hence, each NMR channel consists of a fully autonomous and independent pulse sequence programmer, transmitter and receiver. This opens up new possibilities acquiring multi-receiver NMR experiments[1] since every AVANCE NEO console is inherently multi-receive capable with any available nucleus and probe combination. With the general availability of multi-receive capable NMR spectrometers attractive new combinations of experiments[2] will experience a fast increase in development. Multi-receive experiments are thus expected to substantially contribute in increasing the throughput of NMR spectrometer and hence pushing back one of its strongest limitations, the comparative low sensitivity.

The impact of acquiring several NMR experiments in a single shot is illustrated with an example in the field of reaction monitoring. The protodeboronation reaction of fluorinated aryl boronic acids under basic conditions allows monitoring three suitable isotopes for NMR in the course of the reaction: ^{1}H, ^{19}F and ^{11}B. Simultaneous acquisition schemes with multiple-receivers then allow obtaining kinetic data with a higher temporal resolution as compared to using a conventional acquisition with sequential data collection.

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[2] A. Viegas, T. Viennet, T.Y. Yu, F. Schumann, W. Bermel, G. Wagner, M. Etzkorn,*J Biomol NMR*, **2016** , 64, 9-15.