

# CFH triple resonance probe NMR (Nuclear Magnetic Resonance Spectrometer)

## Summary

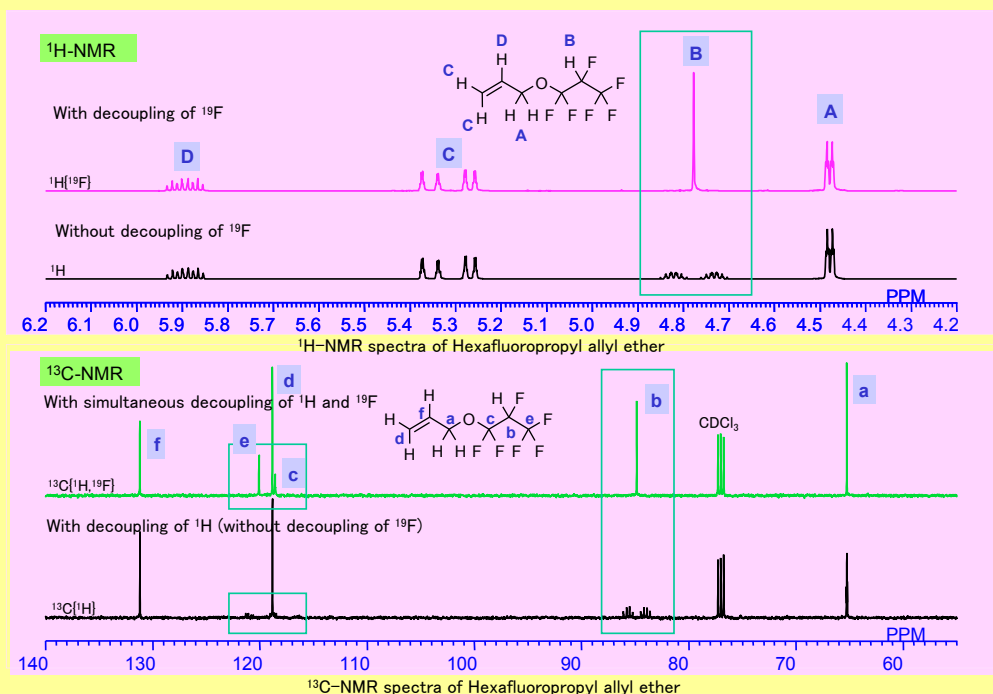
CFH triple resonance probe can measure  $^1\text{H}$  magnetic resonance with decoupling of  $^{19}\text{F}$  and  $^{13}\text{C}$  magnetic resonance with decoupling of  $^1\text{H}$  and  $^{19}\text{F}$  ( $^{13}\text{C}\{^1\text{H}, ^{19}\text{F}\}$ ) simultaneously. As a result, structures of fluorinated materials can be identified more in detail and more precisely. A variety of 2D experiments and all combinations of  $^1\text{H}$ ,  $^{19}\text{F}$  and  $^{13}\text{C}$  are available, including  $^{19}\text{F}\{^1\text{H}\}$ ,  $^1\text{H}\{^{19}\text{F}\}$ ,  $^{13}\text{C}\{^{19}\text{F}\}$ , etc.

### <Difficulties in NMR measurement of fluorinated materials>

- The large coupling constant of  $^{13}\text{C}$ - $^{19}\text{F}$  and  $^1\text{H}$ - $^{19}\text{F}$ 
  - Complicated signal patterns
  - Lower ratio of signal-to-noise
- Resonance frequency of  $^{19}\text{F}$  is close to  $^1\text{H}$ 
  - Interference with a radio wave
- Range of Chemical shift of  $^{19}\text{F}$  is wide
  - Lower precision caused by the lack of decoupling band

### < Merits of CFH triple resonance probe >

- Independent channels for  $^1\text{H}$  and  $^{19}\text{F}$ 
    - Excitation and irradiation of  $^1\text{H}$ ,  $^{19}\text{F}$  without interference with a radio wave
  - Various kinds of decoupling pulses
    - Multi-site decoupling
    - Composite pulse decoupling
    - MPFn, WURST etc.**
- Super broadband decoupling is possible  
 Various kinds of combinations like  $^1\text{H}\{^{19}\text{F}\}$ ,  $^{13}\text{C}\{^1\text{H}, ^{19}\text{F}\}$ ,  $^1\text{H}$ - $^{19}\text{F}$ (2D) are available.



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