Developments and trends in multinuclear solid state NMR for characterisation of inorganic materials

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Solid state NMR still continues to show significant development as a probe technique. It is certainly becoming more multinuclear and this talk will examine some recent work in the Warwick group. Some examples will include bioactive porous silicate glasses and silicate-based composites, and sol-gel prepared phosphates bioglasses. New two-dimensional ^{31}P NMR methods to probe connectivity in phosphate glasses will be examined. Recent work on less studied nuclei that includes ^{93}Nb to probe complex technologically significant niobates will be examined. It is becoming clear that some of the group of nuclei that have been termed "low gamma" (i.e. those with smaller magnetic moments than ^{15}N) can provide key information relating to some intriguing scientific problems. Two such nuclei ^{25}Mg and ^{43}Ca will be explored. High field ^{43}Ca magic angle spinning (MAS) NMR opens up an exciting range of new applications. ^{17}O NMR is a versatile probe of inorganic and biomolecular solids. Examples of advanced NMR techniques such as double angle rotation (DOR) for producing enhanced resolution are given and how these methods can be combined, along with density functional theory to give a comprehensive methodology to understand complex spectra is presented.

Dynamic nuclear polarisation (DNP) is an electron-nucleus double resonance technique that offers the potential for very significant signal enhancement. Warwick has embarked on the construction of two new DNP spectrometers operating at 94 and 395 GHz. The aims and objectives of the project are discussed along with specification of the instruments and an update on progress of signal enhancement for both liquids and solids is presented.

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