Probing the Na atomic order in Na$_x$CoO$_2$, $x=0.67$ and $0.71$ by NMR spectroscopy$^1$ BEN-LI YOUNG, P.-Y. CHU, J.Y. JUANG, Department of Electrophysics, National Chiao Tung University, Taiwan, G.J. SHU, F.-T. HUANG, M.W. CHU, F.C. CHOU, Center for Condensed Matter Sciences, National Taiwan University, Taiwan — The sodium cobaltate Na$_x$CoO$_2$ has a layered structure, consisting of alternating triangular CoO$_2$ and Na planes. Evidences of Na atomic ordering have been reported at certain Na contents by different diffraction experiments. The Co magnetism, strongly influenced by the Na ordering, gives a unique phase diagram in Na$_x$CoO$_2$. In order to investigate the Na ordering and the Co magnetism, we conducted $^{23}$Na and $^{59}$Co NMR experiments in single crystals Na$_x$CoO$_2$ for $x=0.67$ and $0.71$. We found that Na$_{0.67}$CoO$_2$ does not have well-defined Na structural order. However, the oxygen slightly-deficient sample Na$_{0.67}$CoO$_{1.98}$ shows a superstructure, as evidenced by the narrow and well-resolved NMR spectrum. As for Na$_{0.71}$CoO$_2$, Na ordering is also observed. We have tried to solve the Na ordering pattern from our NMR spectra. The results will be discussed and be compared with the existing structural models.

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