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Gas Source Development for Accelerator Mass Spectrometry

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Caesium sputtered ion sources when used on solid graphite powdered samples have been thus far - capable of generating a peak negative (_6ˆ12)C-beam current of around 200-400 μA (˜ 〚10〛 ˆ15 ions/s). However, when using CO2 gas directly as the carbon source –less of the sample is lost during the graphitization process, which is of vital importance when one has a limited amount of the material they want to analyze. Middleton (1984) tested a Cs sputtering ion source to form C - –ions directly from CO2 gas on titanium targets. At which time he produced a 10 μA beam current by using a very low CO2 flow rate of <4 μL/min. (STP) (<2 μg/min. carbon) that was shown to be the best for high sputtering efficiencies of ˜10%. Accordingly, the runtime was longer – but more of the carbon ions were measured. In comparison, when using TiH2 & other solid hydride samples were used to create a negative hydrogen beam (using a similar source as mentioned above), an 80-90 μA peak current was the maximum ever achieved (while 20-30 μA is typical). This report describes the development of novel gas source AMS - to ideally be able to measure tritium ions & other rare isotopes using μg sample sizes.

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