

Study on the novel resonance ionization scheme of strontium for the isotope selectivity enhancement

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Abstract

The resonance ionization spectroscopic (RIS) isotope selectivity of strontium has been studied in terms of narrow natural linewidth transition (689 nm ; $5s^2 \text{ } ^1\text{S}_0 - 5s5p \text{ } ^3\text{P}_1^\circ$, $\Gamma = \sim 7.4 \text{ kHz}$) to the Rydberg state ($n=39$) on this research. Further the alternative scheme has been analyzed with natural sea water sample as well.

Keywords: Resonance Ionization, Strontium-90, Isotope selectivity

1. Introduction

The tracing radioactive isotopes are being interested with its importance of precise monitoring of radioactive isotopes which has low isotopic abundance with isobaric interference, such as ^{90}Sr . In terms of previous study [1-3], we presented the RIS application for the isotopic selectivity enhancement of strontium with natural sea water sample.

2. Experimental

To perform the multi-step RIS, we applied external cavity diode lasers (ECDLs) with natural sea water sample (They contain large amounts of stable isotopes with impurities). Figure presents the energy level diagram of the RIS of strontium which are applied on this study [1, 3].

3. Conclusion

We have applied novel resonance excitation scheme for the optical isotope selectivity enhancement of strontium with the natural sea water sample such as $689.4 \text{ nm} - 487.4 \text{ nm} - 393.8 \text{ nm}$. And also other alternative scheme with the 689.4 nm has been studied as well. Corresponding the experimental results, it is expected that the isotope selectivity can be interrupted by the other molecules which are contained in natural sea water.

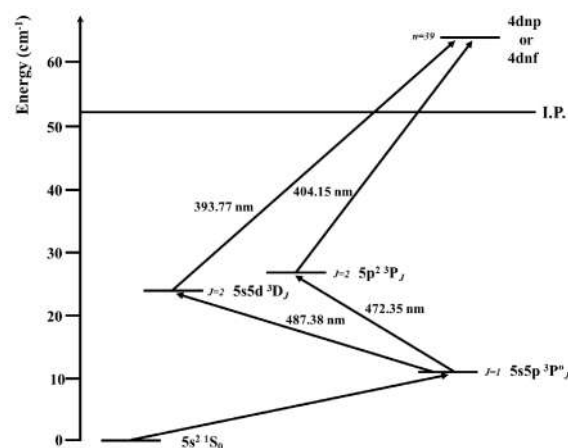


Figure. Energy level diagram of resonance ionization.

References

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