measured by a fiber-optic spectrometer. The strong continuum spectrum and several hundreds of emission lines from UI and UII were observed. By changing delay time between spectrometer and laser pulses, it can be found that the continuum spectrum observed in uranium is not only coming from bremsstrahlung emission but owing to the complex spectrum of uranium. The spectral features of U lines in air and ambient gases of argon, neon, oxygen and nitrogen were also studied in this experiment. As shown in Fig. 1, the results indicate that the intensity of uranium lines were enhanced in argon gas and nitrogen while the intensity of uranium lines were decreased when the uranium was ablated in the cases of air and oxygen for the generation of UO by reaction of uranium and oxygen. More intense uranium lines was observed in argon gas than in nitrogen gas and the minimum gas flow rate of 2.5 L/min is enough for experimental measurement in atmosphere pressure.

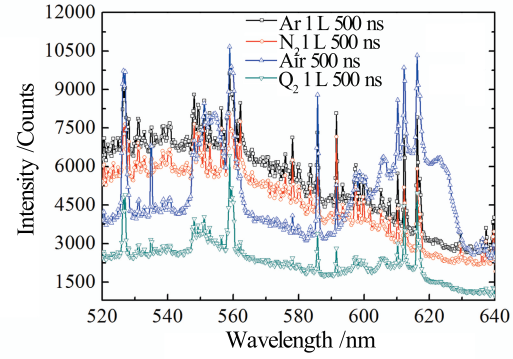

Fig. 1 (color online) Comparison of the spectra of UO in air, argon, nitrogen and oxygen.

A high resolution spectrometer will be equipped in our LIBS system soon and the spectra of uranium and other actinide elements will be analyzed in more detailed. We look forward that the uranium or mixed oxide fuel can be analyzed by the remote and in-situ LIBS detection.

4 - 3 New Insight into Power-law Behavior of Fragment Size Distributions in the C_{60} Multifragmentation Regime*

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Previous experimental work[1] has shown that a Phase Transition (PT) in C_{60} multifragmentation induced by nanosecond laser occurs at almost constant temperature covering a wide range of laser fluency. However, up to now, to the phase transition occurring in C_{60} systems much uncertainty remains regarding its nature. In particular, whether it, like those occurring in other finite systems such as nuclei[2], is also related to a liquid-to-gas phase transition. If so, at the critical temperature, the size distributions of primary intermediate-mass fragments in the multifragmentation regime should obey power law with a particular scaling exponent[3].

In the present work[4], relative yields of ionic fragments (IFs) resulting from the C_{60} multifragmentation were further measured within the PT region and are shown in Fig. 1. By excluding two small IFs and magic IFs due to their abnormal behaviors, the data for residual IFs was used to estimate the size distributions of primary intermediate-mass IFs in the multifragmentation regime. The distributions are found to obey power laws $n^{-\tau}$. Furthermore, the exponent values have sensitive dependence on lower laser fluencies and converge to a constant of about 2.4 ± 0.2 for larger fluencies. These observations are in good agreement with an explanation based on the Fisher droplet model, offering tantalizing possibility of a liquid-to-gas phase transition in C_{60} systems.

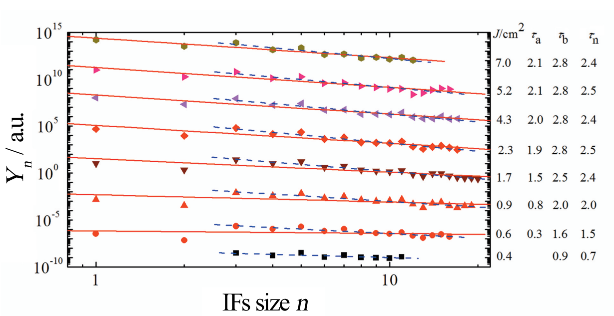

Fig. 1 (color online) Yield distributions of Ionic fragments as a function of the size with different laser fluencies. The relative yield scale of each distribution is given by a multiplication factor.

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