

Isospin Dependence of the $<N/Z>$ in Nuclear Fragmentation

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Fractionation of nuclear matter into a neutron rich gas composing of light clusters and a symmetric liquid phase consisting of heavy fragments has been predicted for isospin asymmetric nuclear matter [1]. This separation of excited nuclear matter into two phases affects the fragmentation process and can be studied by looking at the neutron content of the emitted fragments and how they differ between light and heavy fragments. If excited nuclear matter is separating into two phases, differing in isospin content, then light fragments may condense from the neutron rich gas, and heavy fragments may evaporate off of the more symmetric liquid. This would result in light fragments being more neutron rich than heavier fragments. Figure 1 shows the $<N/Z>$ ratio of various intermediate mass fragments observed in four reactions having different neutron to proton content. The increase in $<N/Z>$ of the fragments with increasing isospin of the system and an overall decrease with increasing Z is clearly evident. The observation indicates that the excess neutrons in the composite system become available in the form of light neutron rich clusters, leaving the heavy fragments with relatively lower neutron content.

References