Temperature Dependence of the Symmetry Energy in Finite Nuclei

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The temperature dependence of the symmetry energy for isotopic chains of even-even Ni (A=58–82), Sn (A=124–152), and Pb (A=202–214) nuclei is investigated in the framework of the local density approximation [1]. The Skyrme energy density functional with two Skyrme-class effective interactions, SkM* and SLy4, is used in the calculations. The temperature-dependent densities are calculated through the HFBTHO code that solves the nuclear Skyrme-Hartree-Fock-Bogoliubov problem by using the cylindrical transformed deformed harmonic-oscillator basis [2]. In addition, two other density distributions of ^{208}Pb [3], namely the Fermi-type density determined within the extended Thomas-Fermi method [4] and symmetrized-Fermi local density obtained within the rigorous density functional approach [5], are used. The results for the thermal evolution of the symmetry energy coefficient in the interval T=0–10 MeV show that its values decrease with temperature being larger in the case of symmetrized-Fermi density of ^{208}Pb. It is observed that for all isotopic chains considered and for both Skyrme forces used in the calculations the symmetry energy coefficient decreases with the increase of the mass number in the same temperature interval.

References

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