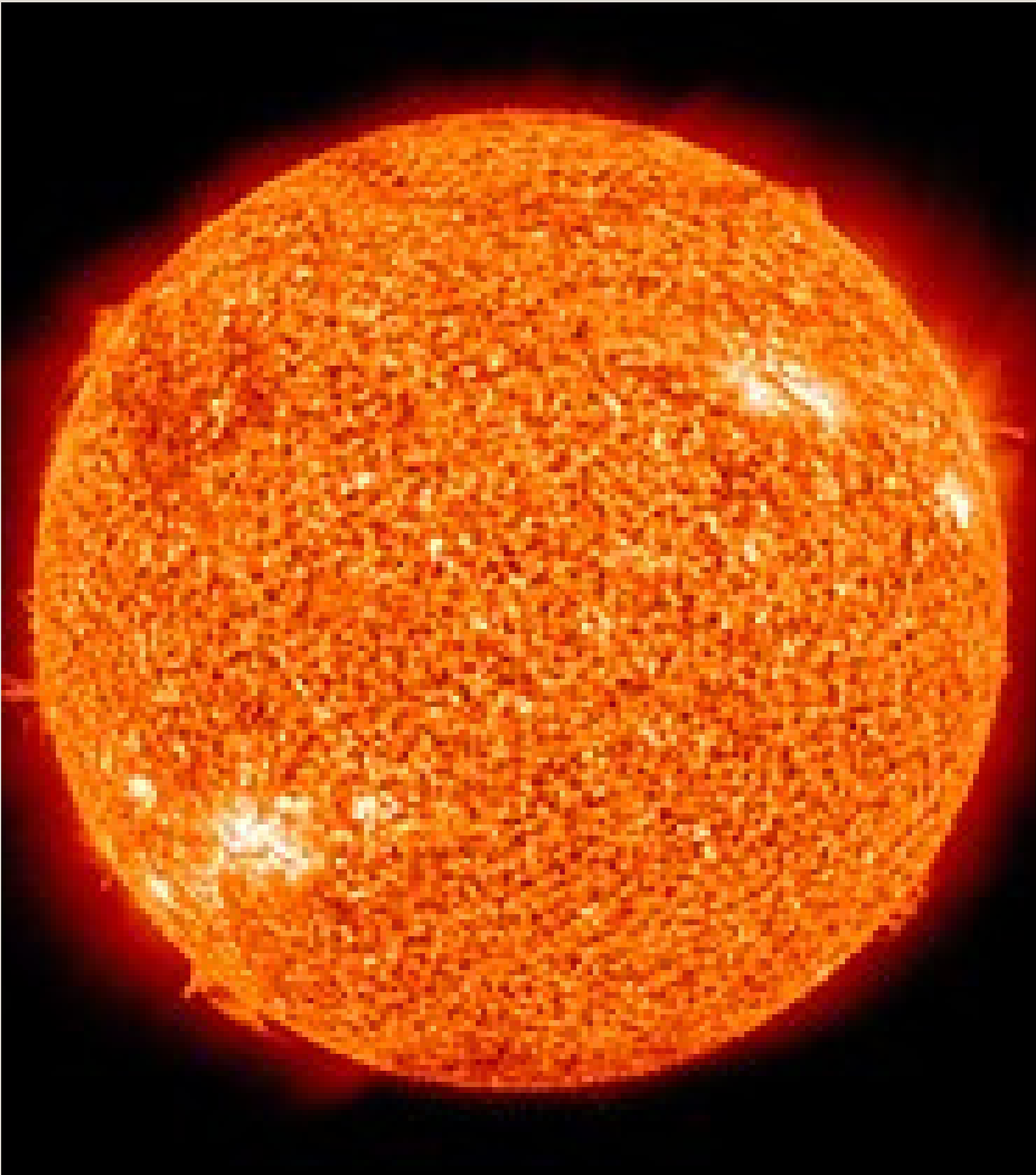
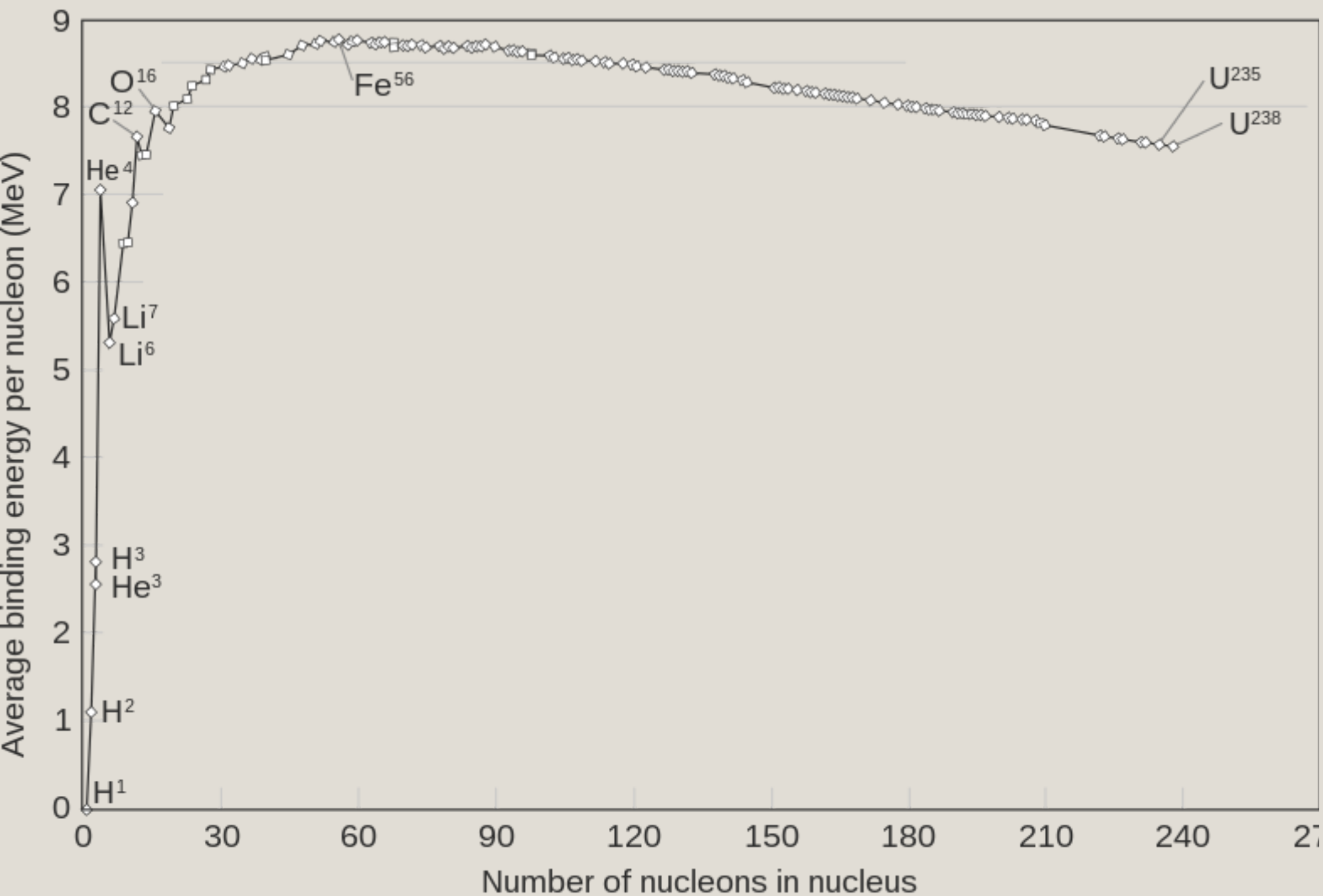


# Nuclear fusion

Nuclear fusion is a reaction in which two or more atomic nuclei are combined to form one or more different atomic nuclei and subatomic particles (neutrons or protons). The difference in mass between the reactants and products is manifested as either the release or the absorption of energy. This difference in mass arises due to the difference in nuclear binding energy between the atomic nuclei before and after the reaction. Nuclear fusion is the process that powers active or main sequence stars and other high-magnitude stars, where large amounts of energy are released.



The Sun is a main-sequence star, and thus generates its energy by nuclear fusion of hydrogen nuclei into helium. In its core, the Sun fuses 500 million metric tons of hydrogen each second.



The nuclear binding energy curve. The formation of nuclei with masses up to iron-56 releases energy, as illustrated above.

A nuclear fusion process that produces atomic nuclei lighter than iron-56 or nickel-62 will generally release energy. These elements have a relatively small mass and a relatively large binding energy per nucleon. Fusion of nuclei lighter than these releases energy (an exothermic process), while the fusion of heavier nuclei results in energy retained by the product nucleons, and the resulting reaction is endothermic.