



**نموذج (I) : بيانات بحث مقدم للترقية  
البحث السادس – مشترك**

**1- عنوان البحث**

عنوان البحث
Modified austenitic stainless-steel alloys for shielding nuclear reactors

**2- البيانات الخاصة بالنشر**

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**5- ملخص البحث باللغة الإنجليزية**

In this study, seven different steel alloys are based on the nominal composition of free cobalt, although cobalt is one of the alloying composite elements, but it is expensive; Therefore, we proceeded to prepare cobalt-free stainless steel by using an electro slag re-melting technique as a radiation shield to reduce production cost. The proportions of the steel compound were determined using XRF techniques. The gamma and neutron shielding properties of 7 different types of stainless steel have been investigated. We have calculated the mass attenuation coefficient ( $\mu/\rho$ ), half value layer (HVL), and effective atomic number ( $Z_{eff}$ ) for total photon interaction in the wide energy range of 80 keV–1333 keV using hyper pure germanium (HPGe) detector and WinXCOM computer program. Furthermore, the macroscopic effective removal cross-sections ( $\Sigma R$ ) for fast neutron were calculated. The dependence of different parameters on incident photon energy and chemical content has been discussed. Among the selected cobalt-free alloy steels, No. A6 with density 8.28 g/cm<sup>3</sup> showed superior gamma ray and neutron shielding properties. This work was carried out to explore the advantages of alloy steels in gamma and neutron protection applications.