Twenty-two novel 1,3-ketourea derivatives bearing ferrocene moiety were synthesized in good-to-excellent yields (up to 99%) via simple and efficient protocol. This solvent- and catalyst-free synthesis was achieved by additions of different ferrocene-containing Mannich bases – 3-(arylamino)-1-ferrocenylpropan-1-ones to phenyl isocyanate promoted only by ultrasound irradiations at ambient temperature. All synthesized 1-aryl-3-phenyl-1-(3-ferrocenyl-3-oxopropyl)ureas were characterized by standard spectral data (^{1}H NMR, ^{13}C NMR and IR), and their electrochemical behavior were investigated by cyclic voltammetry. Detailed single-crystal X-ray diffraction analysis of three representative ferrocene-containing 1,3-ketoureas, among which one crystallized with two independent molecules in an asymmetric unit, were done.