A fractal analysis is presented for (a) the binding of TNF-alpha (tumor necrosis factor) in solution to poly(guanine)-functionalized silica nanoparticles (NOs) (Wang et al., 2006), the binding of different antigens in solution to the anti CD antigen immobilized on a quartz crystal microbalance (QCM) surface (Zeng et al., 2006), (c) the binding and dissociation of cardiomyocytes plus endothelin-1 with and without a DEP (dielectrophoresis) device (Yang et al., 2007), and (d) the binding and dissociation of different concentrations of oxazaborolidine derivatives, BNO1, BNO2, BNO3, and BNO4 + 2 mM sucrose in solution to the enzyme fructosyltransferase (FTF) immobilized on a SPR (surface plasmon resonance) biosensor chip surface (Jabbour et al., 2007). Both, a single- and a dual-fractal analysis are used to model the binding and the dissociation (if applicable) kinetics. The dual-fractal analysis is used only if the single-fractal analysis did not provide an adequate fit. The expressions obtained for the binding and the dissociation rate coefficeints for a single- and a dual-fractal analysis as a function of the fractal dimension indicate a high sensitivity of these rate coefficients on their respective fractal dimensions on the SPR sensor chip surface. Note that the data analysis in itself does not provide any evidence for surface roughness or heterogeneity, and the existence of surface roughness or heterogeneity assumed may not be correct. However, considering the complexity involved on the SPR chip surface, this is not an unreasonable assumption.