

A fractal analysis is presented for different examples wherein biosensors have been involved in drug discovery. This is an important area of investigation wherein there is a continually increasing application of biosensors, and where biosensors are making important contributions. This is particularly so for cases wherein biosensors may be used as a HTS (high-throughput screening) method to quickly narrow down the possible candidates from a wide spectrum of potential candidates. The examples analyzed include (a) inhibitors of protein kinases (Viht et al., 2007) wherein the interactions of adenosine-oligoarginine conjugates (ARC) and alpha isoform of the catalytic subunit (Calpha) of CAPK are examined, (b) the binding of phosphate ion (Pi) to a rhodamine-PBP (phosphate binding protein) fluorescence-based phosphate biosensor (Okoh et al., 2006), and (c) the binding of different concentrations (in mU) of methionine-7-amido-4-methylcoumarin (MET-AMC) and methionine in solution in the cSPA (competitive aminoacyl-tRNA synthetase charging assay) (Forbes et al., 2007). The binding kinetics is described by either a single- or a dual-fractal analysis. A dual-fractal analysis is only used when a single-fractal analysis did not provide an adequate fit. This was done using Corel Quattro Pro 8.0. The fractal dimension provides a quantitative measure of the degree of heterogeneity present on the biosensor chip surface. An increase in the fractal dimension value or the degree of heterogeneity on the surface leads, in general, to an increase in the binding and in the dissociation rate coefficient. For example, for the binding of Calpha in solution to ARC-704 immobilized on a SPR biosensor chip surface (Viht et al., 2007), and for a dual-fractal analysis, the binding rate coefficient,  $k_1$  exhibits an order of dependence between seven and seven and one-half (equal to 7.351) on the fractal dimension,  $D_f1$  or the degree of heterogeneity on the SPR biosensor chip surface. This indicates that the binding rate coefficient,  $k_1$  is very sensitive to the fractal dimension or the degree of heterogeneity present on the sensor chip surface. The three examples to be presented emphasize that the degree of heterogeneity that exists on the biosensor surface does significantly affect, in general, the rate coefficient and affinity values, and subsequently the kinetics in general.