



Zeta Potentials of Solid Surfaces

The Delsa Nano C Particle and Zeta Potential Analyzer, supplied by Beckman Coulter, has a unique capability to measure Zeta potentials of solid surfaces, in addition to determining particle size and particle Zeta potential in a solution. The solid surface Zeta potential measurements are performed with a specially designed flat surface cell.

The procedure for measuring the Zeta potential of a solid surface is similar to a typical Zeta potential measurement for particles. The measurements are carried out through dynamic light scattering of charged probe particles under influences from both electroosmosis and electrophoresis. The true electroosmotic flow due to solid surface Zeta potential is obtained by subtracting the true electrophoretic mobility from the total apparent electroosmotic flow of the charged probe particles.

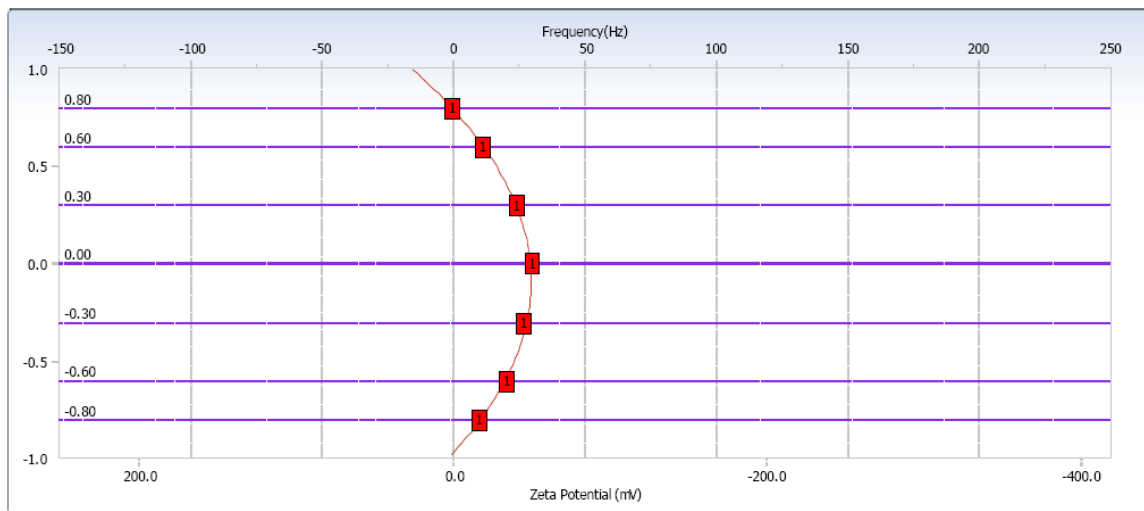


Figure 1. Zeta potentials at different locations in a flat surface cell due to the total apparent electroosmotic flow of the probe particles, obtained during the measurement of the Zeta potential for a Teflon plate surface.

Table 1 Surface Zeta Potentials Measured on Solid Samples

| Sample | Teflon Plate | Lint-Free Cloth | Rubber | Filtration Membrane A | Filtration Membrane B |
|---------------------|--------------|-----------------|--------|-----------------------|-----------------------|
| Zeta Potential (mV) | -51.22 | -34.67 | -24.74 | -34.21 | -13.78 |



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The surface Zeta potentials for several solid samples measured using the Delsa Nano C are shown in Table 1. They were derived from the Zeta potential plots, similar to the plot depicted in Figure 1.

Surface Zeta potentials of solids are extremely useful in filtration membranes for gases, oils, clean and waste waters. Particles and solutes in fluids may have negative or positive charges. A membrane with the same or the opposite charges could increase or decrease passing-through or retaining efficiency of the membrane. Measurements of Zeta potentials of solid surfaces also play important roles in biomedical material developments. Understanding of the surface Zeta potential of implants and catheters may be very helpful in controlling the surface interactions with blood cells. Other applications that could be benefited from Zeta potential measurements of solids include microfluidics, semiconductor wafer surfaces, coatings and thin films for hydrophobicity and hydrophilicity modifications, etc.