What technique do you recommend for measuring zeta potential?

First, a direct answer. I prefer equipment that can be used without diluting the dispersion. This equipment measures the particle motion acoustically and is commercially available from:

Colloidal Dynamics	www.colloidaldynamics.com
Matec Applied Sciences	www.matec.com

The sensitivity of electroacoustics increases when the density and concentration of the disperse phase are large. The weakness of this technique is that no one is confident about how to convert the signal to zeta potential when the concentration is high.

If the dispersion can be diluted without changing the charge on the particle, suitable electrophoretic equipment is available from:

Bechman-Coulter	www.beckmancoulter.com
Brookhaven Instruments	www.bic.com
Malvern Instruments	www.malvern.de
Particle Sizing Systems	www.pssnicomp.com

The weakness of this technique is that dilution is not easy because the chemistry of the serum needs to remain the same. This is usually done by centrifuging the dispersion to get a particle-free solution and using that solution to dilute.

Second, an indirect answer. Usually we are interested in measuring the zeta potential because we want to determine the stability of a dispersion. But the stability of a dispersion depends on more than just the electric potential, it also depends on the ionic strength. Another, and simpler, method to measure the stability of a dispersion is to see how much salt can be added to the dispersion before it flocculates. The concentration of salt that just flocculates a dispersion is called the critical coagulation concentration, or CCC. Not only is it simple to measure, it really gives a more direct measure of stability; there are no complicated theoretical calculations to apply.

A word about electroacoustics: The idea is either to apply an oscillating electric field and sense the movement of the particles by the pressure pulses generated or to move the particles with pressure pulses and sense the electric field generated. A nice advantage is that the dispersion does not need to be transparent. The cell doesn't even have to be transparent!

A word about microelectrophoresis: The original technique was to measure the motion of the particles while looking through a microscope. Nowadays the motion of particles is measured with laser Doppler velocimetry (LDV). The moving particles are illuminated by crossed laser beams and the frequency of the scattered light is measured. This still requires the particles to be dilute enough that multiple scattering is not significant. Hence, dilute dispersions are still required.

