

Electro-Biogrouting and Its Challenges.

ABSTRACT

Biogrouting is a new method to stabilize sandy soils through precipitation of CaCO_3 between grains. This process decreases the permeability about 98% and increases the soil strength up to 12Mpa. It is created by bacterium *Bacillus Pasteurii* and enzyme urease that hydrolyze urea to carbonic dioxide and ammonia. A major problem in biogrouting is the distribution of bacteria injected into the soils. The bacteria grows more in at 30-37°C and pH 9.2, but cannot be distributed homogeneously in soil through biogrouting technique. It depends on the grain size, mineralogy, and properties of the pore fluid. The electrokinetic (EK) technique transports charged particles and fluid in porous media. This technology moves a wide range of particles, including ions, metals and organics. The *Bacillus* bacteria are rod-shaped bacterium with many negative charges in the surface. The electrokinetic can probably transport bacteria towards the cathode in an experimental cell and can distribute them uniformly in porous media of soils for fertile biogrouting. It explains a wide range of diffusion of bacteria influenced electric current. However, basic environment electrokinetic phenomena can probably affect bacterial membrane composition and metabolic activity, but it also justifies an increase of soil pH and can provide a positive effect on microbial activity and bacterial community of *Bacillus Pasteurii*. Furthermore distribution of the urease enzyme could be possible in electrokinetic environment since the urease enzyme has a negative charge at pH of more than 5.5. The urease enzyme is a negatively charged at a pH more than 5.5 which is able to move and diffuse in electrical environment.

Keyword: Biogrouting; *Bacillus Pasteurii*; Urease enzyme; Electrokinetic.