

CLAIMS:

1. A system for the separation and detection of inorganic anions in a sample, the system comprising:
 - 5 • a separation channel with an inner coating of three or more alternating layers of a cationic polymer and an anionic polymer, wherein the first layer and the final layer are cationic polymer layers;
 - a detector for detecting inorganic anions that pass through a detection zone of the separation channel;
 - 10 • an injection system for injecting fluids including sample solutions and background electrolyte into an inlet end of the separation channel;wherein the background electrolyte comprises polyethyleneimine, and the cationic polymer forming the cationic polymer layers is not polyethyleneimine.
- 15 2. The system of claim 1, wherein the anionic polymer forming the anionic polymer layer is a sulfonated or sulphated polymer or copolymer.
3. The system of claim 1 or claim 2, wherein the cationic polymer forming the cationic polymer layers is a hexadimethrine polymer or a polydiallyldimethylammonium polymer.
- 20 4. The system of claim 1 or claim 2, wherein the cationic polymer forming the cationic polymer layers is hexadimethrine bromide.
- 25 5. The system of any one of claims 1 to 4, wherein the system comprises a controller for controlling the injection system, flow of fluids through the separation channel, and operation of the detector for the detection of the inorganic anions.
6. The system of claim 5, wherein the controller controls a channel coating sequence for application of the alternating layers of cationic polymer and anionic polymer onto the separation channel.
- 30 7. The system of any one of claims 1 to 6, wherein the separation channel has 3, 5 or 7 coating layers.
- 35 8. A system for the separation and detection of inorganic anions in a sample, the system comprising:

- a receiver shaped to receive a replaceable cartridge that contains a separation channel with an inner coating of three or more alternating layers of a cationic polymer and an anionic polymer, wherein the first layer and the final layer are cationic polymer layers;
 - 5 • a detector positioned to detect inorganic anions that pass through a detection zone of the separation channel when the cartridge containing the separation channel is positioned in the receiver;
 - an injection system for injecting fluids including sample solutions and background electrolyte into an inlet end of the separation channel
 - 10 contained in the cartridge, when the cartridge is positioned in the receiver;
 - a controller for controlling the injection system, flow of fluids, operation of the detector for the detection of the inorganic anions.
9. A method for the separation and detection of inorganic anions in a sample
- 15 using electrophoresis, the method comprising a sample processing sequence which comprises:
- introducing a sample and a background electrolyte comprising polyethyleneimine into a separation channel coated with alternating layers of a cationic polymer and an anionic polymer, wherein the first layer and the final layer of the separation
 - 20 channel coating are cationic polymer layers, and the cationic polymer forming the cationic polymer layers is not polyethyleneimine;
 - applying a voltage potential across the separation channel to effect a separation of the inorganic anions; and
 - detecting the presence of the separated inorganic anions.
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10. The method of claim 9, comprising locating a cartridge comprising the separation channel into a position so as to allow the sample processing sequence to be conducted, prior to conducting the sample processing sequence.
- 30 11. The method of claim 9, comprising locating a cartridge comprising the separation channel and a background electrolyte reservoir into a position so as to allow the sample processing sequence to be conducted, prior to conducting the sample processing sequence.
- 35 12. The method of claim 10 or claim 11, comprising performing multiple sample processing sequences prior to replacing the cartridge with a replacement cartridge after performing multiple sample processing sequences.

13. The method of claim 12, comprising replacing the cartridge with a replacement cartridge after performing not less than 1000 sample processing sequences with the replaced cartridge.
- 5 14. The method of any one of claims 9 to 13, wherein the cationic polymer forming the cationic polymer layer is hexadimethrine bromide, the anionic polymer forming the anionic polymer layer is polystyrene sulfonate.
- 10 15. A separation capillary for the separation and detection of inorganic anions in a sample, comprising an inner coating of three or more alternating layers of a hexadimethrine polymer and polystyrene sulfonate or a copolymer, salt or derivative thereof, wherein the first layer and the final layer are hexadimethrine polymer layers.
- 15 16. A cartridge comprising a separation capillary, wherein the separation capillary comprises an inner coating of three or more alternating layers of a hexadimethrine polymer and polystyrene sulfonate or a copolymer, salt or derivative thereof, wherein the first layer and the final layer are hexadimethrine polymer layers.
- 20 17. The cartridge of claim 16, further comprising a background electrolyte reservoir comprising a polyethyleneimine-containing background electrolyte composition.
- 25 18. The cartridge of claim 17, wherein the concentration of polyethyleneimine in the background electrolyte composition is between about 0.04 and 0.08% by weight.
19. The cartridge of any one of claims 16 to 18, wherein the hexadimethrine polymer is hexadimethrine bromide.
- 30 20. The cartridge of any one of claims 16 to 19, which is shaped for releasable insertion into a receiver of a system for the separation and detection of inorganic anions in a sample.