Claims

1. An ionic conducting gel that comprises:

a polymeric adhesive material in an amount of from 5 to 20 wt% of the gel;

a metal salt in the amount of from 2 to 10 wt% of the gel; and

the balance being a hydrophilic polymeric material, wherein a gel matrix is formed by intermolecular interactions between the polymeric adhesive material and the hydrophilic polymeric material, and the metal salt is distributed throughout the gel matrix; and

wherein the hydrophilic polymeric material is a polyethylene glycol.

2. The ionic conducting gel according to Claim 1, wherein the number average molecular weight of polyethylene glycol is from 200 to 15,000 Daltons.

3. The ionic conducting gel according to Claim 2, wherein the polyethylene glycol has a number average molecular weight of 200.

4. The ionic conducting gel according to any one of the preceding claims, wherein the polymeric adhesive material is selected from one or more of the group consisting of a polysaccharide, a cellulose hydrogel, a protein hydrogel, a nucleic acid gel, a biohydrogel and, more particularly, poly(N-vinyl caprolactam) (PVCL), polyvinyl pyrrolidone (PVP), polydopamine, and a polymeric acrylic.

5. The ionic conducting gel according to Claim 4, wherein the polymeric adhesive material is selected from one or more of the group consisting of poly(N-vinyl caprolactam) (PVCL), polyvinyl pyrrolidone (PVP), polydopamine, and a polymeric acrylic.

6. The ionic conducting gel according to Claim 5, wherein the polymeric adhesive material is poly(N-vinyl caprolactam) (PVCL).

7. The ionic conducting gel according to any one of the preceding claims, wherein the polymeric adhesive material represents about 10 wt% of the total weight of the gel.

8. The ionic conducting gel according to any one of the preceding claims, wherein the metal salt is selected from one or more of the group consisting of a an iron salt, a sodium salt, a potassium salt, a calcium salt, and a magnesium salt.

9. The ionic conducting gel according to Claim 9, wherein metal salt is sodium chloride.

10. The ionic conducting gel according to any one of the preceding claims, wherein the metal salt is represents about 5 wt% of the total weight of the gel.

11. The ionic conducting gel according to any one of the preceding claims, wherein the gel matrix consists of the polymeric adhesive material and the hydrophilic polymeric material.

12. A flexible electrode device, comprising:

a flexible substrate material having a first surface and a second surface;

a metal electrode pad on the first surface of the substrate; and

an ionic conducting gel layer that covers the metal electrode pad, wherein the ionic conducting gel is as described in any one of Claims 1 to 11.

13. The electrode device according to Claim 12, wherein the device further comprises two or more metal electrode pads on the first surface of the substrate,

where each of the two or more metal electrode pads is electrically connected to at least one conductive pathway,

where each of the two or more metal electrode pads is covered by an ionic conducting gel layer, and

where each conductive pathway is covered by an insulating material.

14. The electrode device according to Claim 12 or Claim 13, wherein the impedance of the electrode device is approximately from 10^{-3} to 10^{5} Ω at from 1 to 10^{6} Hz.

15. The electrode device according to Claim 13, wherein the two or more metal electrode pads is from 2 to 512, such as 8 to 256, such as from 15 to 128 metal electrode pads.

16. A prosthetic control system comprising one or more electrode devices according to Claims 12 to 15.