

WHAT IS CLAIMED IS:

1. An electrochromic device comprising:
a first electrode, second electrode and an electrochromic composition including one or more electrochromic materials;
wherein at least one of the one or more electrochromic materials undergoes electron exchange only at either the first electrode or at the second electrode.
2. The electrochromic device of claim 1, wherein either or both of the first electrode or the second electrode comprise a semiconductor material at an interface with the electrochromic composition.
3. The electrochromic device of claim 1, wherein the first electrode includes a material that is different than a material of the second electrode.
4. The electrochromic device of claim 1, wherein the electrochromic composition is disposed between and in contact with the first electrode and second electrode and configured to change light transmission from one state to another state in response to an input signal between the electrodes.
5. The electrochromic device of claim 1, wherein the electrochromic composition is configured to change light transmission from one state to another state in response to an input signal.
6. The electrochromic device of claim 1, wherein the electrochromic composition is configured to change visible light transmission from one state to another state in response to an input signal.
7. The electrochromic device of claim 1, wherein the electrochromic composition includes a cathodic compound and an anodic compound as the one or more electrochromic materials and wherein either or both of the first electrode or the second electrode selectively allows reducing and oxidizing substantially only the cathodic compound and/or its reduced forms, while substantially prohibiting reduction and oxidation of the anodic compound.
8. The electrochromic device of claim 1, wherein the electrochromic composition includes a cathodic compound and an anodic compound as the one or more electrochromic materials and wherein either or both of the first electrode or the second electrode selectively allows reducing and

oxidizing substantially only the anodic compound and/or its oxidized forms, while substantially prohibiting reduction and oxidation of the cathodic compound.

9. The electrochromic device of claim 1, further comprising a selectively permeable membrane within the electrochromic composition and disposed between a first and second electrode.

10. The electrochromic device of claim 9, wherein the membrane has a center portion and a peripheral portion and wherein the center portion has a permeability different than that of the peripheral portion.

11. The electrochromic device of claim 9, wherein the membrane has a center portion and a peripheral portion and wherein the center portion has permeability higher than that of the peripheral portion.

12. The electrochromic device of claim 1, wherein the first electrode, second electrode, and electrochromic composition define a variable transmittance layer (VTL), and wherein the VTL has electrical properties that are different in a central portion of the VTL than in a periphery of the VTL.

13. The electrochromic device of claim 1, wherein the electrochromic composition is in the form of a gel.

14. The electrochromic device of claim 13, wherein the electrochromic layer in the form of the gel has electrical properties that are substantially different in different areas of the gel in a lateral direction of the gel.

15. The electrochromic device of claim 1, further comprising a controller to apply the input signal, wherein the controller is electrically connected to the first and second electrodes by distributed, multi-point electrical connections to minimize ohmic drops across the electrodes and/or wherein the controller is configured to operate both electrodes at ion-transfer limiting conditions of the electrochromic composition.