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be potential acid gas sensors due to their specific color associated with chemical binding of each acid gas. These systems can also be fabricated on solid supports such as silica or alumina to make gas scrubbing respirators or other potential dosed system gas scrubbers. In addition, these new ionic liquids can be employed as reversible solvents and reagents in chemical reactions, as reactants in separations chemistry, ligands for phase-transfer catalysis, potentially reversible surfactants, reversible metal complexing, metal capture or chelation; phase catalysis or scrubbing systems; as temperature controlled acid reagents, and in other applications.

The SO₂BOL zwitterionic liquid can be used at the laboratory and industrial scale for any applications where SO₂ is the chemical trigger to switch polarity, miscibility, or conductivity. Examples of applications of the SO₂BOL zwitterionic liquid for chemical separations include but are not limited to flue gas scrubbing, post-combustion acid gas absorption, and desulfurization of gas streams, The SO₂BOL zwitterionic liquid can be used as a SO₂ sensor either by color change or electrical. Examples of the SO₂BOL zwitterionic liquid in miscibility applications include but are not limited to reversible surfactants, solvent separations and coatings for chromatography columns for separations chemistry. The SO₂BOL zwitterionic liquid can also be used in applications where a conductivity switch would be required, examples include but are not limited to use as media for electrochemical reactions, electrical sensors or battery electrolytes. The SO₂BOL zwitterionic liquid can also be used as a chemical coating or

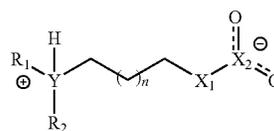
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functionalized on a support. The zwitterionic liquids can also be used as reversible ligands for phase-transfer catalysis, metal complexing or capture, or as temperature controlled acid reagents.

While various preferred embodiments of the invention are shown and described, it is to be distinctly understood that this invention is not limited thereto but may be variously embodied to practice within the scope of the following claims. From the foregoing description, it will be apparent that various changes may be made without departing from the spirit and scope of the invention as defined by the following claims.

What is claimed is:

1. A reversible zwitterionic liquid having the structure



wherein R1 is selected from the group consisting of alkyl, aryl, silyl, ether, and ester, R2 is selected from the group consisting of alkyl, aryl, silyl, ether, and ester, X1 is selected from the group S, and O; X2 is S; n is between 1 and 20 carbon links or an organic linker, and Y is any structure that can connect with R1, R2 and H as shown.

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