What is claimed is:

CLAIMS

1. An electrochemical separation device comprising:

a first electrode;

a second electrode;

a cell stack including alternating depleting compartments and concentrating compartments disposed between the first electrode and the second electrode;

an inlet manifold configured to introduce a fluid to one of the depleting compartments or the concentrating compartments;

an outlet manifold; and

one or more of:

a fluid flow director disposed within the inlet manifold and having a surface configured to alter a flow path of the fluid introduced into the inlet manifold and direct the fluid into the one of the depleting compartments or the concentrating compartments, and

a second fluid flow director disposed within the outlet manifold and having a surface configured to alter a flow path of the fluid introduced into the outlet manifold via one of the depleting compartments or the concentrating compartments,

wherein a fluid flow path through the depleting compartments is perpendicular to a fluid flow path through the concentrating compartments,

wherein the fluid flow director is disposed within the inlet manifold and is arranged to at least partially block a bypass current through the inlet manifold,

wherein the fluid flow director defines a fluid flow path through the inlet manifold between different portions of the cell stack that has a cross-sectional area less than a cross-sectional area of the inlet manifold,

wherein the cell stack has an average current efficiency of at least 85%.