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(54) **ANNEALED GARNET ELECTROLYTE SEPARATORS**

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(57) **ABSTRACT**

Set forth herein are pellets, thin films, and monoliths of lithium-stuffed garnet electrolytes having engineered surfaces. These engineered surfaces have a list of advantageous properties including, but not limited to, low surface area resistance, high Li^+ ion conductivity, low tendency for lithium dendrites to form within or thereupon when the electrolytes are used in an electrochemical cell. Other advantages include voltage stability and long cycle life when used in electrochemical cells as a separator or a membrane between the positive and negative electrodes. Also set forth herein are methods of making these electrolytes including, but not limited to, methods of annealing these electrolytes under controlled atmosphere conditions. Set forth herein, additionally, are methods of using these electrolytes in electrochemical cells and devices. The instant disclosure further includes electrochemical cells which incorporate the lithium-stuffed garnet electrolytes set forth herein.