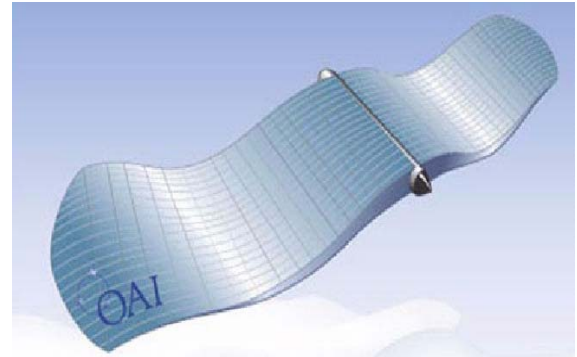


ANTHONY COLOZZA
Ohio Aerospace Institute
Solid State Aircraft

A revolutionary system type of unmanned aircraft may now be feasible due to recent advances in polymers, photovoltaics and batteries. This aircraft is a "solid state" aircraft, with no conventional moving parts. Airfoil, propulsion, energy storage and control are combined in an integrated structure for the first time.

The most innovative aspect of this concept is the use of an ionic polymeric-metal composite (IPMC) as the source of control and propulsion. This material has the unique capability of deforming in an electric field like an artificial muscle, and returning to its original shape when the field is removed. Combining the IPMC with emerging thin-film batteries and thin-film photovoltaics provides both energy source and storage in the same structure.



Combining the unique characteristics of the materials enables flapping motion of the wing to be utilized as the main propulsion. With a flight profile similar to a hawk or eagle, the Solid State Aircraft will be able to soar for long periods of time and utilize flapping to regain lost altitude.

Recent discoveries and developments in these materials have indicated that this concept, on a preliminary level, may provide a robust advanced aeronautical architecture suitable for both terrestrial and planetary missions.

Combining and building on the research for these materials and on flapping wing aerodynamics, we have organized a collaborative team to investigate the integration and application of these technologies for a revolutionary aeronautical system.