Quarterly Management Report

WBS Element	Project Title	Contract Number	Contract Start	Contract End
ORNL-3H	Economical Fabrication of Membrane Materials	FEAA028		

Performer Name and Address	Principal Investigator(s)
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BUDGET AND COST REPORT

Prior Year Funds [$K]	104
Total Current Year Commitment $K]	200
Projected Current Year Costs [$K]	304

	O	N	D	J	F	M	A	M	J	J	A	S
Planned Costs	17	33	50	66	83	100	116	133	150	166	183	200
Actual Costs	1	9	37	50	70	122						
Variance	16	24	13	16	13	(22)	116	133	150	166	183	200

MILESTONE REPORT

Milestone Designation	Milestone Description	Due Date	Revised Due Date	Completion Date
1	Colloidal characterization of Ca2Fe2O5 materials for oxygen separation will be initiated	03/01/05		12/04/04
2	Ca2Fe2O5 coatings will be deposited onto porous metallic supports by dip coating and densified for testing	06/30/05		03/30/05
3	Colloidal characterization will be initiated on La2Mo2O9	05/30/05		
4	Coatings of La2M2O9 protonic conductors initiated (09/2005)	09/30/05		

TECHNICAL HIGHLIGHTS

Previously, we characterized the zeta potential and rheological behavior of CaAlxFe2-xO5 particles (x = 0 and 0.4) in dilute and concentrated, aqueous suspension. Poly(acrylic acid)-poly(ethylene oxide) comb polymers were identified as effective dispersants for these systems. Furthermore, low molecular weight hydroxycarboxylic acids, e.g. citric acid, tartaric acid, etc., were identified as effective additives to prevent the cementitious behavior of calcium ferrite particles in aqueous suspension. Thin films were formed on porous, metallic supports via dipping in stable suspensions of Ca2Fe2O5 with solids loading ranging between 20-53.3 vol%, 10 mg citric acid/m2 Ca2Fe2O5, and 2 mg PAA-PEO/m2 Ca2Fe2O5. Suspensions of 20 and 40 vol% Ca2Fe2O5 were conducive for forming uniform coatings that survived the sintering process, which was carried out in flowing argon (300) in temperatures up to 1050oC. Future work will entail SEM analysis to characterize the microstructure and thickness of the coatings. The chemical composition will be characterized with EDS analysis.

The work on the calcium ferrite materials was brought to a conclusion this quarter. Films deposited over the last 2 to 3 quarters were sintered between 1000 and 1075°C for 1-3 hours. The samples in all cases fully densified, however, in samples heated to 1050*C or greater significant diffusion between the calcium ferrite and the stainless steel substrate occurred. Significant concentrations of Cr were measured in the thick film. Only those samples sintered at 000*C showed no evidence of second phases within the film or at the interface. While the mechanical quality of these films has not been measured it is believed that this approach is viable for fuel cells and gas separation membranes.

ISSUES

None

Report Prepared By	Date
T. Armstrong	05/01/05