



NASA SBIR/STTR Technologies

Efficient, Long-Life Biocidal Condenser

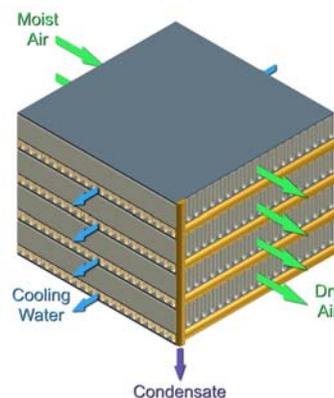
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 Proposal No. **X11.01-9477**



Identification and Significance of the Innovation

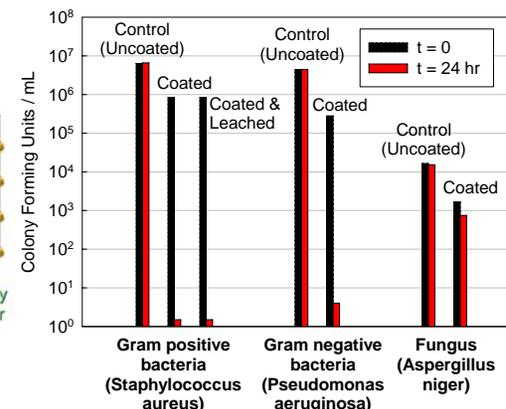
- Condensing heat exchanger (CHX) for ECLSS
 - Controls humidity by condensing moisture from cabin air
 - Requires hydrophilic coating for efficient and reliable performance
 - Provides attractive breeding ground for microbes—must include biocidal agents
 - Coating in the space station CHX are coming off the surface
- Innovation: Novel coating and heat transfer surface
 - Novel coating formulation forms very strong bonds with surface
 - Provides long-term hydrophilic and biocidal surface properties
 - Can be applied directly to complex heat exchanger surfaces
- Builds on established condenser design

Condensing Heat Exchanger



Condensing surfaces are coated with hydrophilic, biocidal coating

Phase I Test Data



The coating is almost instantly lethal to bacteria and destroyed over half the fungus within 24 hours

Technical Objectives and Work Plan

- Improve safety and reliability of manned lunar and planetary bases
 - Prevent growth of microbes and related health/safety hazards
- Technical objectives for coating and condenser
 - Prevent microbe growth and associated problems
 - Hydrophilic (controls condensate flow for efficient operation)
 - Long life (good adhesion, long-lasting wetting and antimicrobial action)
- Phase II work plan
 - Optimize the coating process
 - Life test coating samples
 - Test prototypical condenser surfaces
 - Produce condensing heat exchanger

NASA and Non-NASA Applications

- NASA Applications/Project Constellation
 - ECLSS for manned lunar and/or planetary bases
 - ECLSS for future manned spacecraft
 - Space station upgrades to replace existing condensing heat exchanger
- Non-NASA Applications
 - Water management for fuel cell power systems
 - Hydrophilic coatings for any condensing heat exchanger
 - Biocidal coatings for any water heat transfer surface
 - Coatings for compact heat exchanger/reactors

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