

NALSUN-NG™

Indigenously Developed Eco-friendly - Next Generation NALSUN Coating

CSIR-National Aerospace Laboratories developed a solar selective NALSUN coating for domestic water heater applications in the late 1980s, and the technology has been transferred to 29 industries. However, due to the presence of hexavalent chromium, the coating bath is carcinogenic, and its disposal is a challenge. Hence, there was a need to develop an eco-friendly process as an alternative to existing NALSUN technology. In addition, there was a need to develop a cost-effective, eco-friendly, and easily scalable coating technology that is not available in the country. Toward this, CSIR-NAL has developed an eco-friendly sprayable spectrally selective coating for domestic solar water heater applications with the following unique features:

- The coating process is RoHS and REACH-compliant.
- No volatile organic compounds are used in the process.
- Selection of cost-effective raw materials, and the coating process can be easily scaled up with near-zero chemical waste.
- The spectrally selective coating consists of two layers: an absorber layer and an inorganic protective layer.
- Adaptability of coating on various metal substrates like aluminum, copper, mild steel, galvanized iron, and stainless steel at a substrate temperature of 150°C.
- The coatings exhibit a high solar absorptance in the range of 0.91 - 0.93 and thermal emittance in the range of 0.21 - 0.30 at 82°C.

A sprayable formulation was prepared to deposit directly on metal substrates without any pre-treatment. The coating displays good thermal stability up to 175°C in air for longer durations. The coating has qualified stringent environmental tests such as humidity, condensation, accelerated aging, UV, and corrosion resistance as per the ASTM and International Energy Agency Standards. Based on the test results, the service life of the coating is expected to be more than 20 years.

Intellectual property for the developed coating has been protected through patent (Application no. 202311022581) and trademark application, and these are pending for grant.

In view of the above, the NALSUN-NG technology has huge market potential because it can act as an alternative to the present NALSUN technology and also for the evacuated tube collector technology. Further, the technology can also be easily modified for various other applications, such as solar desalination, solar drying, heating and cooling of buildings, industrial process heat applications, etc. The other spin-off of this technology could be in the area of supercapacitors, battery electrodes, transparent conductors, solar cells, and chemical sensors.

Click the link below for NALSUN-NG Technical brochure & Product video

<https://www.nal.res.in/en/technology/nalsun-ng>