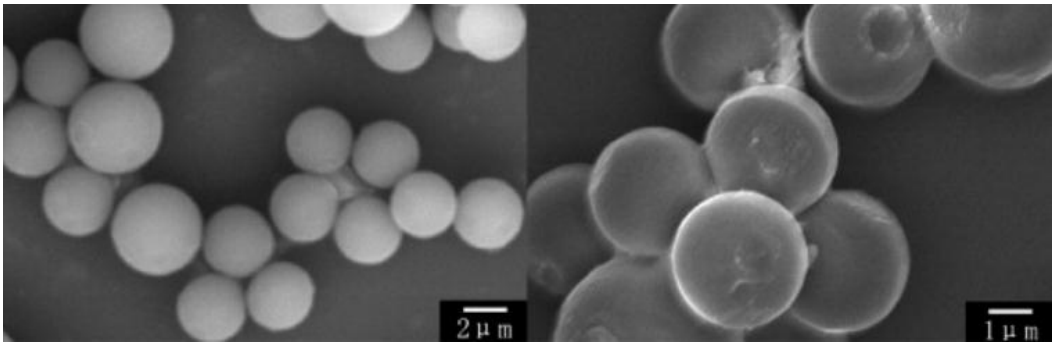
Prosjektoppgave/Project work
Tittel: Elektrisk ledende laminater for høyspennings sjøkabler
Title (eng): Electrical conducting laminates for high voltage polymeric subsea cables

Prosjektbeskrivelse (no):
Nye anvendelser for høyspennings sjøkabler har frembrakt et behov for endring av det tradisjonelle kabeldesignet: Fra masse/oljeimpregnerte isolasjonssystem til polymere materialer; fra tykk og tung blykappe til lette "smarte" barrieredesign basert på polymere materialer. Slike kabler kan for eksempel benyttes som dynamiske kabler knyttet til flytende installasjoner til offshore vindmøller.
En av komponentene som kan inngå i et fremtidig sjøkabeldesign er tynne, hybride (metall/polymer) laminat. Den primære funksjonen til slike laminat er å unngå vanninntrenging inn i kabelsystemet som kan redusere levetiden. Laminatene skal også være mekanisk robuste og elektrisk (halv-) ledende. For at de elektriske egenskapene skal bli tilstrekkelig tilfredsstillende, må limet i laminatet fylles med et elektrisk ledende fyllstoff. Dette arbeidet inngår i et pågående forskningsprosjekt ved SINTEF Energi, Elkraftteknologi, der produsenter av fyllstoff, laminater og høyspenningskabler deltar.

Prosjektbeskrivelse (eng):
New use of high voltage subsea cables has produced needs to change the traditional designs: from mass- or oil impregnated electrical insulation systems to polymeric materials, and from thick and heavy outer lead sheaths to "smart" barrier design based on polymeric or hybrid lightweight materials. Such cables are especially attractive as dynamic cables for floating installations for offshore wind or oil exploitation.
One component that can be essential in a future cable design is a thin, hybrid (metal/polymeric) laminate. The main function of such laminates is to avoid water ingress extending the service lifetime of the cables. However, as the cables will be subjected to dynamic loads, the laminates must also be mechanical robust. Finally they have to be electrically conductive. The glue used during lamination must therefore be electrically conductive, and then filled with conductive particles. A laminate as described here does not exist today.

This project work will be included in an on-going research project at SINTEF Energy Research, where manufacturers of high voltage cables and laminates also participate.



SEM images of anisotropic polymeric microspheres (polystyrene).

The project work is mainly experimental, and will include mechanical/electrical characterisation of the laminates at different conditions. The resistance to heat is essential. Fillers that are considered are e.g. silver coated polymeric mono-dispersive spheres, and multi-walled carbon nanotubes. The study also includes scanning electron microscopy (SEM) of interfaces of the same samples. Training in SEM will be given.

It will be possible to continue this work in a Master work in 2014. Characterisation of the performance of such laminates included in a prototype high voltage subsea cable can be actual (modelling and measurements).

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