

**C9.2****New potentialities of conducting polymers for cables**

COTTEVILLE D., CARIOU F., Alcatel Corporate Research Center, Marcoussis, France

MIREBEAU P., Alcatel Cable, Calais, France

DEMAY J.N., Alcatel Cable, Lyon, France

PARASIE Y., Alcatel Cable, Paris, France

**Résumé**

La PANi est le polymère conducteur qui offre le plus d'opportunités pour des applications industrielles. La PANi est aujourd'hui le polymère conducteur le plus stable. Cette propriété permet de formuler la PANi avec les thermoplastiques habituellement utilisés dans l'industrie des câbles. Sa très grande plage de conductivité permet de choisir le type de PANi en fonction de l'application spécifique. Les études entreprises à Alcatel en collaboration avec les universités et la DGA depuis 1985 confirment les potentialités de la PANi pour des applications industrielles dans le domaine de l'électricité et de l'électronique. Des possibilités de transfert industriel sont envisagées pour des applications spécifiques : haute tension, filtrage.

**1 - Introduction**

In various cable domains - HV and EHV cables, special cables - the new technologic stresses demand the tuning of new materials. Policy (new standards...) and economical (new markets...) requirements also motivate this evolution. In this frame intrinsically conductive polymers (ICP) can provide innovative solutions.

ICP have gained in importance with the discovery of doped polyacetylene (PA) in 1977.

The high conductivity level obtained - near that of metal - has opened perspectives in many domains (molecular electronic, electromagnetic shielding...). Nevertheless the great instability of PA has obliged to

**Abstract**

Polyaniline (PANi) is the conducting polymer (ICP) which offers very promising opportunities for industrial applications. PANi is to day the most stable conducting polymer. This property allows to formulate PANi with thermoplastic currently used in the cable industry. Its very large range of conductivity allows to adapt the type of PANi according to specific applications. Studies undertaken in Alcatel with universities and Direction Générale de l'Armement (DGA) since 1985 confirmed the potentialities of PANi for electrical and electronic industrial applications. Industrial possibilities were assessed based on specific applications : high voltage(HV), filtering.

study others ICP's : polypyrrolle, polythiophene, polyaniline (PANi)...

PANi is the ICP, which offers very promising opportunities for industrial applications. Its very high stability allows to formulate PANi and to incorporate into thermoplastics currently used in cable industry.

The progresses achieved in the PANi chemistry - especially the discovery of secondary doping concept in 1994 [1] - allow to obtain a very large range of conductivity from  $10^{-9}$  S/cm to  $10^3$  S/cm.

We have showed that undoped PANi was insulating under low electrical field and conductive under high electrical field [2] and these non-linear properties can be used to replace the classical inner "semi-con" layer of HV power cable by a compound based on undoped PANi.