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Picolinium-based Eutectic Systems (ESs) as Sustainable Lubricants for NEMs/MEMs

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PURPOSE OF THE ABSTRACT

Eutectic systems (ESs or deep eutectic solvents, DESs) have recently been proposed as ?green? alternatives to mineral oils and ionic liquids (ILs) in the lubrication of several surfaces.[1,2]
ESs have similar physical and chemical properties to ILs such as high chemical and thermal stability, high ionic conductivity, low flammability and ease in dissolving organic, inorganic and polymeric materials, but they possess the advantage of being cheaper and easier to prepare.
In a previous work, we already reported sulfur-containing DESs that showed very promising lubrication properties.[3]
In this work, new picolinium salts-based ESs were prepared by mixing picolinium based ILs and base oil PEG 200. All prepared ESs were tested in the lubrication of silicon surfaces, which are relevant for nano/microelectromechanical systems (NEMS/MEMS).
In this context, all ESs were characterized in terms of water content, viscosity, wettability and tribological properties. The friction coefficients were measured using steel spheres against Si surfaces. The most promissory ESs showed a good tribological performance, both in terms of friction and wear reduction comparing to conventional lubricant PEG 200.

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FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Eutectic systems | Lubricants | NEMs/MEMs | Silicon

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