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Product development and simulations for Enhanced Oil recovery (EOR)

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Chemical Enhanced Oil Recovery (EOR) is currently and mainly based on the use of partially hydrolyzed polyacrylamide as water-soluble polymer for mobility control. This choice is predominantly related to technological (thickening efficiency) as well as economic considerations. However, the presence of salt in the underground water significantly reduces the effect of such polymer on the solution rheology. This becomes even less when the polymer is used in combination with alkali. Therefore the amount of polymer required is significantly higher than expected on the basis of simple rheological models, which in turn has a clear negative effect on the economics of the process. Against this backdrop, the search for alternative water-soluble polymers has been gaining a predominant attention at both academic and industrial level. In this work we report on the synthesis and use of branched non-ionic polyacrylamide solutions for EOR. The polymers have been prepared by controlled radical polymerization to yield well-defined structure with variable number and length of the arms. The rheological behavior has been investigated as function of the macromolecular architecture as well as of concentration and presence of salt. The obtained results clearly indicate the validity of this approach since the thickening capability of the branched polymers is clearly improved with respect to the linear ones. Moreover, the non-ionic character of the material renders it insensitive in terms of solution viscosity to the presence of salts. Last but not least, the branched structure also confers to this material a slightly more prominent resistance to alkaline hydrolysis with respect to the linear ones.

Biography

F.Picchioni has completed his PhD in 2000 from the University of Pisa (Italy) and postdoctoral studies from the Technical University of Eindhoven (The Netherlands). Since 2013 he is full professor and chair of the group Chemcial Product Engineering at the University of Groningen (The Netherlands). He has published more than 100 papers in reputed journals.

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