**Supporting Information**

# Electron Transfer at Oxide/Water Interfaces Induced by Ionizing Radiation

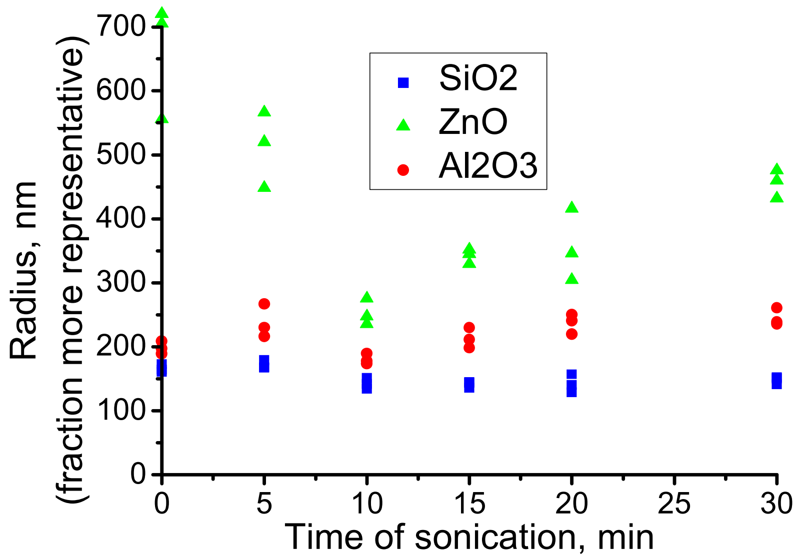
*E. Chelnokov[1], V. Cuba[2], D. Simeone[3], J.-M. Guigner[4], U. Schmidhammer[5], M. Mostafavi[5], S. Le Caër[1*]*

*[1] Institut Rayonnement Matière de Saclay*
*Service Interdisciplinaire sur les Systèmes Moléculaires et les Matériaux,*
*UMR 3299 CNRS/CEA SIS2M*
*Laboratoire de Radiolyse, Bâtiment 546*
*F-91191 Gif-sur-Yvette Cedex, France*
*[2]Faculty of Nuclear Sciences and Physical Engineering,*
*Czech Technical University in Prague, Brehova 7,*
*Prague 1, Czech Republic*
*[3] Matériaux Fonctionnels pour l'Energie*
*Equipe mixte CEA-CNRS-ECP*
*DEN/DANS/DMN/SRMA/LA2M, CEA Saclay*
*F-91191 Gif sur Yvette, France*
*[4] Institut de Minéralogie et de Physique des Milieux Condensés*
*IMPMC, UMR 7590, CNRS*
*Université Pierre et Marie Curie, Tour 23, Campus de Jussieu*
*4 Place Jussieu,*
*F-75252 Paris Cedex 05, France*
*[5] Laboratoire de Chimie Physique*
*UMR 8000 CNRS/Université Paris-Sud 11*
*Bâtiment 349, Université Paris-Sud 11*
*F-91405 Orsay Cedex, France*

***** Corresponding Author

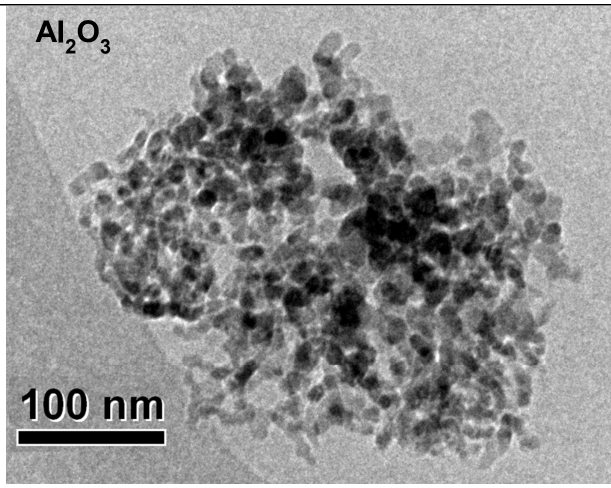
Tel: +33 1 69 08 15 58; Fax: +33 1 69 08 34 66; E-mail: sophie.le-caer@cea.fr

**Figure SI-1**




*Choice of optimal sonication conditions.* For three different suspensions ($SiO_2$: blue squares; ZnO: green triangles and $Al_2O_3$: red diamonds), the radius of the most representative fraction of the aggregates present in the suspensions is measured by Dynamic Light Scattering and is given as the function of the time of sonication. The experiments were performed using an automatized light scattering instrument (Zetasizer Nano ZS). The smallest size is obtained for a sonication time of 10 minutes. This sonication time was then used throughout this work to prepare the suspensions.

**Figure SI-2**

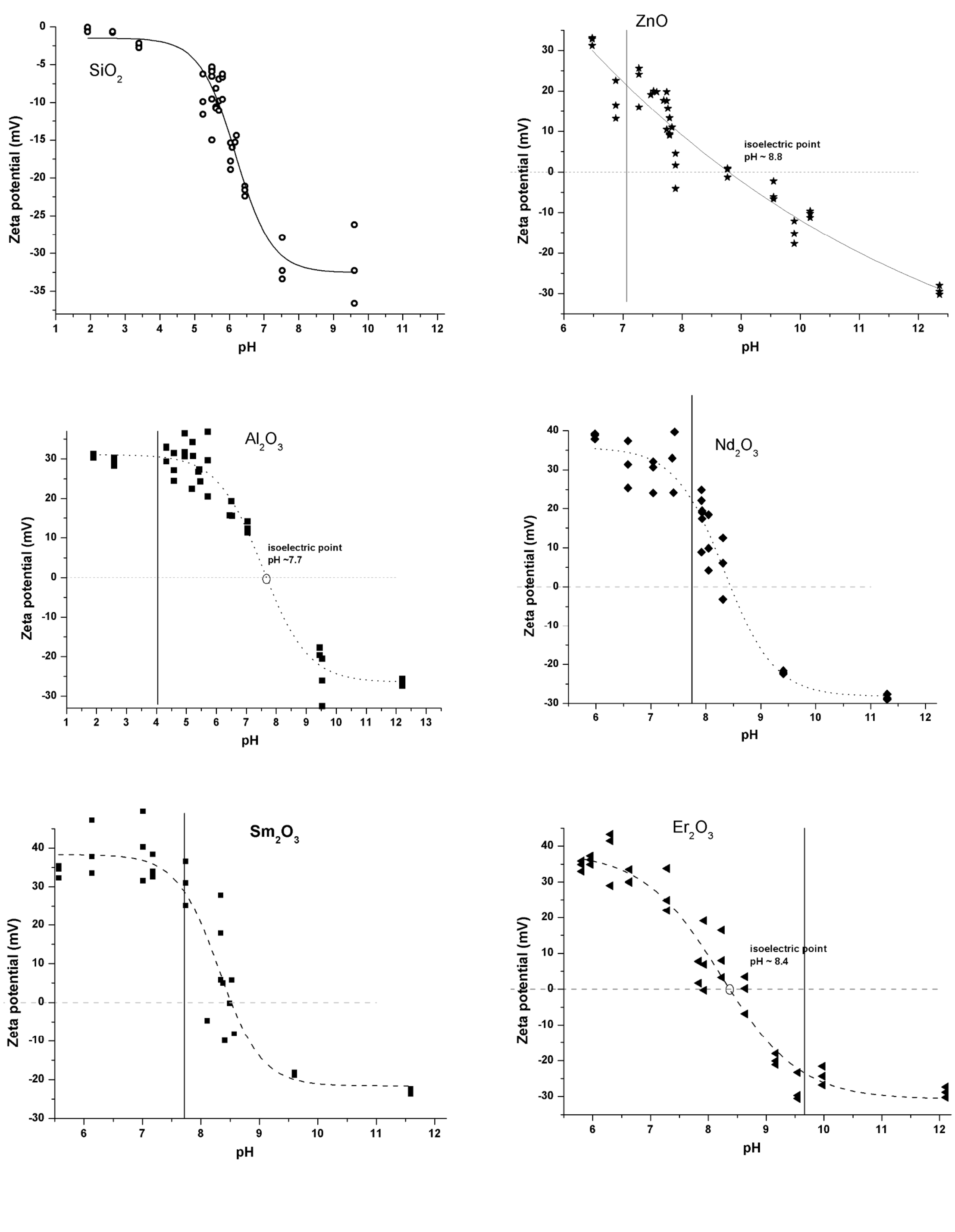



**Cryogenic Transmission Electron Microscopy**

*CRYO-TEM photo of the $Al_2O_3$ suspension.*

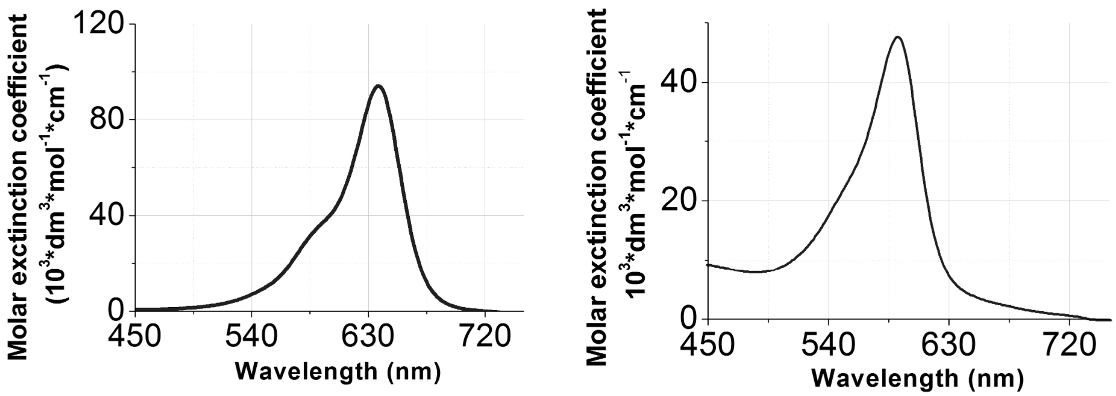
For the Cryo-TEM analysis, a drop of solution was deposited on a Quantifoil grid (MicroTools GmbH, Germany). The excess of solution was then blotted out with a filter paper, and before evaporation the grid was quench-frozen in liquid ethane to form a thin vitreous ice film. The grid was then maintained all the time at 96 K to prevent evaporation and crystallization of the ice film. We used a $LaB_6$ JEOL JEM 2100 (JEOL, Japan) Cryo-TEM operating at 200 kV. The images were taken on an ultrascan 2k CCD camera (GATAN, USA) and with a JEOL low dose system (Minimum Dose System, MDS) to protect the thin ice film from any irradiation before imaging and reduce the irradiation during the image capture.

## Figure SI-3




*Zeta potential curves for all studied oxides.* The vertical line indicates the pH of the studied nanoparticle suspensions. Therefore, under our experimental conditions, all nanoparticles are positively charged except $SiO_2$ and $Er_2O_3$. In the case of silica, the zeta potential is always negative in the studied pH range.

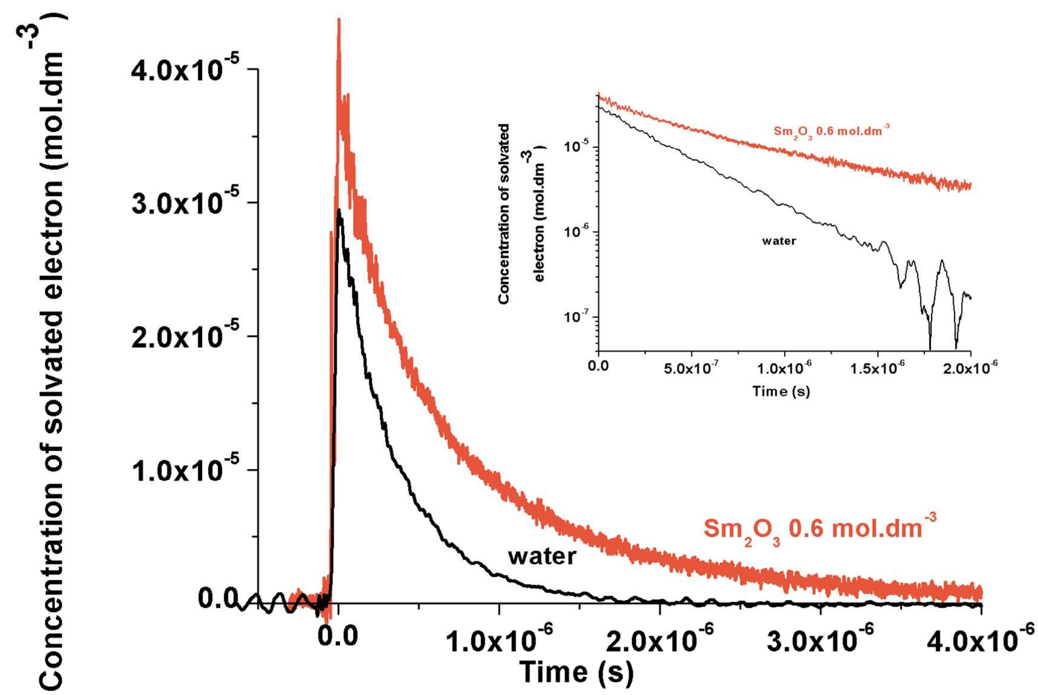
**Figure SI-4**




**(a)** **(b)**

*Molar extinction coefficient of the two dyes used in the present study: (a) patent blue V and (b) bromophenol blue.*

**Figure SI-5**




*Solvated electron concentration decay recorded after 10-ns electron pulses absorption at 633 nm in a 1 mm optical path cell in water (black) and in an 18% wt (0.6 mol.dm$^{-3}$) $Sm_2O_3$ suspension (orange). The two decays are represented with a logarithmic scale in the inset.*

**Table SI-1**

| System | Dynamic viscosity of 0.6 $mol.dm^{-3}$ suspension (cP) | Dynamic viscosity of 2.2 $mol.dm^{-3}$ suspension (cP) |
|---|---|---|
| $Er_2O_3$ | 6.45 ± 0.16 | |
| $Sm_2O_3$ | 2.70 ± 0.05 | |
| $Nd_2O_3$ | 2.00 ± 0.08 | |
| $Al_2O_3$ | 1.95 ± 0.02 | 11.64 ± 0.15 |
| ZnO | 1.06 ± 0.02 | 6.79 ± 0.64 |
| $SiO_2$ | 1.24 ± 0.02 | 2.87 ± 0.10 |
| $H_2O$ | 1.01 ± 0.01 | |

*Dynamic viscosities of the different suspensions, expressed in cP.*