Supporting Information

*Trypanosoma cruzi* virulence factors for the diagnosis of Chagas’ disease

Cecilia Yamil Chain1*, Dênio Emanuel Pires Souto 2*, María Laura Sbaraglini1, Carlos A. Labriola 4, María Antonieta Daza Millone1, Eduardo Alejandro Ramírez1, José Sebastián Cisneros3, Constanza. Lopez-Albizu5 Karenina Scollo5, Lauro T. Kubota 6, Andrés Mariano Ruiz5 and María Elena Vela1

1 Instituto de Investigaciones Fisicoquímicas Teóricas y Aplicadas (INIFTA) Universidad Nacional de La Plata-CONICET, Diagonal 113 y 64 S/N (1900) La Plata, Argentina

2 Department of Chemistry, Federal University of Paraná (UFPR), Avenida Coronel Francisco Heráclito dos Santos, 100; Jardim das Américas (81530-000) Curitiba, PR, Brazil

3 Laboratorio de Investigación y Desarrollo de Bioactivos (LIDeB), Departamento de Ciencias Biológicas, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, calle 47 200-236 (ARB1900AJJ) La Plata, Argentina

4 Fundación Instituto Leloir, Instituto de Investigaciones Bioquímicas de Buenos Aires (IIBBA-CONICET), Universidad Nacional de Buenos Aires, Av. Patricias Argentinas 435 (AR C1405BWE) Ciudad de Buenos Aires, Argentina

5 Instituto Nacional de Parasitología “Dr. Mario Fatala Chabén”- Administración Nacional de Institutos y Laboratorios de Salud (ANLIS), Avenida Paseo Colón 568 (C1063ACR) CABA, Argentina

6 Instituto Nacional de Ciência e Tecnologia em Bioanalítica, Unicamp, Rua Josué de Castro s/nº, Cidade Universitária - Barão Geraldo (13083-861) Campinas, SP, Brazil

* Correspondence to yamil@inifta.unlp.edu.ar, denioemanuel@yahoo.com.br
TS and CrP surface coverage on MPA covered-sensor chips

Surface coverage can be estimated through de Feijter equation\(^1\) which relates the surface density \(\Gamma_p\) of the layer with the refractive indexes of a layer \(n_p\) and the medium \(n_m\), the refractive index increment \((dn/dc)\) and the layer thickness \(d_p\):

\[
\Gamma_p = \frac{(n_p - n_m)d_p}{dn/dc}
\]  

(1)

The shifts in SPR minimum angle \(\Delta\Theta\) are proportional to the changes in the refractive indexes \(^2\):

\[
n_p - n_m = \Delta n = \Delta \Theta \cdot k
\]  

(2)

where the constant \(k\) is the sensitivity coefficient for the instrument. According to equations (1) and (2), the surface coverage can be rewritten as:

\[
\Gamma_p = \frac{\Delta \Theta \cdot k \cdot d_p}{dn/dc}
\]  

(3)

For thin films (< 100 nm), \(k \cdot d_p\) is approximately constant\(^3\) and for aqueous buffers in contact with Au sensors at 670 nm of laser wavelength in the SPR device used in this paper, this value is \(1.0 \times 10^{-7}\) cm/degree. Taking into account \(\Delta \Theta\) (Table S1) and a \(dn/dc\) value of 0.168 \(cm^3/g\) \(^4\) we can estimate the surface coverage of TS and CrP in 184 ng/cm\(^2\) and 148 ng/cm\(^2\), respectively.
Table S1. Mean angular shifts ($\Delta \Theta$) achieved to estimate the surface coverage ($\Gamma_p$) and hydrodynamic diameters (Dh) and molecular weights (M.W.) employed to calculate the close packed coverage ($\Gamma_p^*$).

<table>
<thead>
<tr>
<th>Protein</th>
<th>$\Delta \Theta$ [deg]</th>
<th>Dh [nm]</th>
<th>M. W. [kDa]</th>
<th>$\Gamma_p$ [ng/cm$^2$]</th>
<th>$\Gamma_p^*$ [ng/cm$^2$]</th>
<th>% ($\Gamma_p$/$\Gamma_p^*$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS</td>
<td>0.309</td>
<td>5.5</td>
<td>70</td>
<td>184</td>
<td>444</td>
<td>41</td>
</tr>
<tr>
<td>CrP</td>
<td>0.248</td>
<td>5.0</td>
<td>51</td>
<td>148</td>
<td>422</td>
<td>35</td>
</tr>
</tbody>
</table>

In order to relate these values to a fully covered surface, we considered a close packed array of proteins (Scheme S1). Taking into account the hydrodynamic diameters (Dh) the area per molecule is 26.20 nm$^2$ for TS and 21.65 nm$^2$ for CrP. Then, considering the molecular weights (M.W.), the surface coverage rises to 444 ng/cm$^2$ (TS) and 421 ng/cm$^2$ (CrP). Now, the estimated surface coverage of the MPA-covered chips can be expressed as percentages of the fully covered surface (Table S1).

Scheme S1. Close packed array of globular proteins and unit cell considered for area per molecule calculation.
References


